EDP industry report and market review

PUBLISHED BY INTERNATIONAL DATA CORPORATION NEWTONVILLE MASS

EDP Industry Report is published by International Data Corporation, the largest consulting company specializing in computer industry analysis and market research. IDC provides computer equipment manufacturers, programming, service and leasing firms, and major investment groups with forecasts, trend studies, market research and product and company analyses. Description information on IDC services is available on request.

EDP europa report

EDP Europa Report, a newsletter similar to EDP Industry Report, is published 24 times a year by IDC Europa, based in London. Its staff includes experienced European technical journalists and market research specialists. **EDP Europa Report** carries a census of European computer installations, frequent articles on the products and services of American firms and European based manufacturers, and reports on their activities in markets outside the Continent. Subscriptions to **EDP Europa Report,** mailed by air from London, are $65, available through IDC in Newtonville, Massachusetts.

INTERNATIONAL DATA CORPORATION
NEWTON, MASS. 02160
LONDON • NEW YORK • LOS ANGELES • BOSTON

EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" ANNUAL INDEX • VOLUME 5 P.J. McGOVERN, EDITOR

Sept. 11, 1969 to Dec. 9, 1970

This index has been expanded to give our readers a more detailed guide to recent issues of **EDP Industry Report.** References to tables have been underlined, and if the actual title of the table is used, it is CAPITALIZED. The dates of previous **EDP/IR** volumes are as follows:

Volume 1 — March 23, 1964 to Jan. 15, 1966
Volume 2 — March 15, 1966 to June 15, 1967
Volume 3 — June 28, 1967 to July 24, 1968
Volume 4 — July 31, 1968 to Aug. 29, 1969

EDP Industry Report is published twenty-four times each year by International Data Corp., 60 Austin Street, Newtonville, Mass. 02160 (tel. 617/969-4020). Single copies can be obtained at their original prices and prices for multiple copies will be quoted on request. A handsome grey binder convenient for storing back copies of **EDP/IR** is available for $5. Please send requests to the Circulation Manager.

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E|D|P industry report

● A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" SEPTEMBER 11,1969 ● VOL.5,NO.1 P.J.McGOVERN,EDITOR

Mid-year Review

COMPUTER SHIPMENTS UP, BUT ORDERS DROP TO FOUR-YEAR LOW; CUSTOMERS TAKE WAIT-AND-SEE ATTITUDE AS INDUSTRY EVALUATES UNBUNDLING

The first half of 1969 ended up about as expected . . . at least as far as computer shipments go. But first-half shipments of nearly $4 billion are just about the only thing that can be considered normal. With litigation pending and unbundling about to begin, the outlook for most industry sectors is positive in general but filled with many unknowns. In addition, the mid-year computer-system backlog of almost $6.3 billion is at the lowest rate since the end of 1965.

These highlights from EDP/IR's second annual mid-year examination of the electronic data processing industry illustrate the volatile period in which the industry finds itself. And many of today's uncertainties are expected to continue until at least the first of the year, when more is known about IBM's actual plans for computer marketing in the 1970s. Here are some conclusions from our mid-year look at the industry:

- The order level was 7.5% lower than at year-end 1968. This was expected, since the first half of 1969 was filled with uncertainty. IBM, with orders down over 8%, accounted for most of the decline; GE's orders are down sharply; CDC, Honeywell, RCA and Univac stayed about the same; and only Burroughs and NCR showed significantly increased orders.

- First-half shipments of $3.8 to $4.0 billion would certainly not prevent attainment of the $8.2 to $8.4 billion projected six months ago (EDP/IR, Mar.25,1969). The age of the present generation of computers has caused a shift from shipments of total systems to shipments of add-on equipment. Nearly 50% of first-half 1969 shipments consisted of peripherals and additional memory units to augment the capabilities of systems already installed.

- IBM increased its short-term dominance of the industry, shipping just under $3 billion -- some 75% to 77% -- of the first-half total. This seems natural, as many competitive customers delayed deliveries, waiting to see what IBM's mid-year announcements would bring.

- Under unbundling, the prognosis for most segments of the computer industry is favorable. On the other hand, many ground rules have changed, and the participants who don't recognize this may find the going even rougher than ever. (See sector analysis starting on page 6.)

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CURRENT STATUS OF MAINFRAME MANUFACTURERS

Despite the ever-increasing number of new firms in the "computer industry" and the constant creation of new "industry sectors," the general activity in the computer business depends critically on the mainframe manufacturers. They make the computers, set the pace, and lay the ground rules under which the industry operates.

IBM. Last June, IBM made its promised announcement about the new pricing policies. This set of moves -- called "unbundling" -- wasn't exactly what anyone expected, and it introduced many new factors into the makeup of the computer marketplace. While the unbundling was done under pressure, IBM seems to have turned the move to its advantage. Unbundling may cost IBM some of its market share (which it will probably be glad to part with), but it seems certain to increase the company's long-term profits. Here is a capsule summary of what IBM announced and what IBM stands to gain.

- o All systems engineering services will now be charged at an hourly rate earning IBM up to $35 an hour for each systems engineer on the job.
- o Education will be charged to the customer, allowing IBM to profit from costly training courses which were formerly given free.
- o Almost all new software will be redefined as a "program product" and as such will be offered to users under a license agreement -- potentially a huge revenue source for the company, hitherto untapped.
- o With its new "custom contract services" IBM will be able to "assume responsibility for performance of specified tasks, such as the design and installation of a data processing system," and will be able to get in on what promises to be a fast growing market -- facilities management (see page 8).
- o The lease and purchase price of computer equipment is to be reduced by approximately three percent. This rather nominal price reduction was claimed by IBM to reflect its marketing costs for the services the user will now have to purchase separately under IBM's new scheme. IBM should experience no loss of revenue as a result of this reduction.

The new rental prices become effective October 1; the other pricing changes go into effect -- for present customers -- on January 1, 1970. Many people feel that the full impact of the new IBM approach won't be felt until just after the first of 1970, when new equipment models, a new sales plan and perhaps other surprises will be unveiled.

The uncertainty caused by the anti-trust suits and the preparations for unbundling upset many of IBM's previously planned product announcements. Because of the lack of these new products and because many customers were waiting for the unbundling announcement, IBM's order backlog at mid-year was over 30% below its level a year earlier. Partly to remedy this, IBM has recently announced the System/3 and it has also announced its new super-computer, the 360/195. The announcements of the long-awaited 360/35 and 360/45 have been delayed until early next year, at which time IBM's backlog should return to more normal proportions.

The System/3 was another major coup for IBM. The little computer is expected to vastly increase IBM's customer base -- without directly impacting any other computer manufacturer. As the needs of the System/3 users grow, they can be expected to remain IBM customers -- ensuring a rapidly growing market IBM can tap for years.

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Burroughs. Burroughs seems to be doing well with a bread and butter product line. The B500 series continues to book new orders and the Series LTC, terminal accounting machine line, has turned into quite a success. Even the old B5500 continues to generate new business, despite its age and second-generation technology.

Deliveries of the B500 series, especially the B2500 and B3500, have been in high gear for over a year, with the Air Force taking many of the B3500s (EDP/IR, Mar.12,1969). The more powerful models in the line, the B6500 and B7500, are now in the process of making their commercial debuts. The fate of the B8500, which was planned as the top end of the B500 line, remains uncertain. There are no indications that most of its major problems have been solved and users are turning to alternative systems.

The increasingly popular Series LTC is really a single mechanism that comes in different containers and may, or may not have communications capabilities. Without the communications capability it becomes the L2000, a "billing computer," otherwise, it is a "TC," terminal computer. Although the success of the Series LTC is to some degree dependent on the success of the B6500 and B7500, it has also been ordered in large numbers for use with non-Burroughs systems.

CDC. CDC continues to ship its 3000 and 6000 series computers and has just announced a new model, the 6700, to top off the 6000 series. The first deliveries of the most powerful member of the 3000 series, the 3500, were made early this year, so both of CDC's biggest product lines have new, compatible models to which users can expand.

The big news at CDC continues to be the 7600, which is also compatible with 6000 series software. The second 7600 is expected to join the first at the Lawrence Radiation Lab shortly. Several more deliveries are expected during the next year and a half, while CDC is constructing additional manufacturing facilities. So far, CDC has at least six orders for the giant system, including some from commercial customers. EDP/IR learned of at least one order for a corporate management information system to be run on a 7600. The market for the 7600, in the long run, is difficult to estimate, especially, since the introduction of IBM's 360/195, but CDC's President Norris still talks of shipping 100 7600s.

GE. GE's computer hardware operations are clearly in poor shape. About the only encouraging sign is that GE finally seems to realize what its problems are and is trying to straighten them out. The company's top computer executives from around the world are currently huddled in Florida trying to coordinate their efforts. The recent death of John Haanstra was a serious loss to the company , especially at a time of a corporate re-structuring of its computer operations.

The 100 series is doing reasonably well, both here and in Europe, but it appears to be GE's only marketable line. The 200 series and the 400 series are both showing their age and are unable to compete effectively with the newer competition. Shipments of the 400 series continue, but the backlog is falling rapidly. The 600 series is basically sound, but early software problems prevented its gaining much commercial acceptance.

Rumors are flying about a new GE product line to be announced in a year or so. The management huddle in Florida is probably largely concerned with the nature of the new line and the result may be a delay in its announcement if the company decides on a new approach to the computer market, which is different from the one which shaped the product's development.

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Honeywell. Honeywell's shipment level of newly produced data processing equipment is a little short of last year's pace, although the company is delivering an unusually large number of refurbished computers.

New production of Honeywell's long-time bread and butter product, the H-200, has finally stopped. The company is now offering a broader line of systems, which range from the very small to the medium-large computer. The H-125, H-1250 and the H-2200 are being shipped in quantity and full-scale production of the H-4200 began earlier this year. A few deliveries of the H-8200, Honeywell's largest model, have been made, but production problems are limiting the system's shipment rate.

NCR. Despite some produciton difficulties with its Century computers, NCR's 1969 first half shipments are over 40% higher than last year's. Total orders for the new line have crept past 1500 and are still rising. The first deliveries of the Century 200 were delayed two months by problems in the manufacture of its memory units, but NCR claims to be solving the problem and expects to reach its targeted production rate of 100 Century computers a month within a few months.

The Century's software is falling short in several areas. Several application packages have had to be rewritten for use on more expensive systems and others have hot yet been released, although NCR has been able to make some 315 software packages run on Century computers using emulation modes. One especially serious failing is the lack of a tape-sort routine, a basic part of a computer's system software. It is perhaps indicative of the series' software that no catalog of the Century's software library is yet available.

NCR has announced plans to expand the Century series, both upwards and downwards. The next model, presumably the Century 300, is expected to be announced this year. Also expected shortly is a "revised pricing policy." This policy is likely to be different from any other manufacturer's and should be announced "within sixty days."

RCA. RCA is now emphasizing the time-sharing and communications capabilities of its Spectra 70 line. The 70/46 has demonstrated the marketability of these capabilities and it has recently been joined by the more powerful, also time-sharing oriented, 70/61. RCA's backlog remained rather stagnant during the first half, but apparently the summer has produced many new orders. The 70/35 has shared in this success, especially after the new disk version became available.

RCA's Information Systems Division has long suffered from corporate neglect and has suffered the loss of several key people over the last year. A new management team is planning to generate more profits by concentrating on the larger national accounts which can order five or tenof the more powerful Spectra models at a crack.

Univac. Univac's fortunes continue to rest on the 1108. The company's other lines are doing well, but not well enough to maintain Univac's market share should 1108 shipments sag. A smaller version of the 1108, called the 1106, was introduced some months ago to shore up the 1108 market. So far, its reception has been good, although Univac has been especially careful not to allow it to impact the market for the more expensive 1108. Larger models of the series are expected in the near future to offer an up-grade possibility for current users of the aging 1108.

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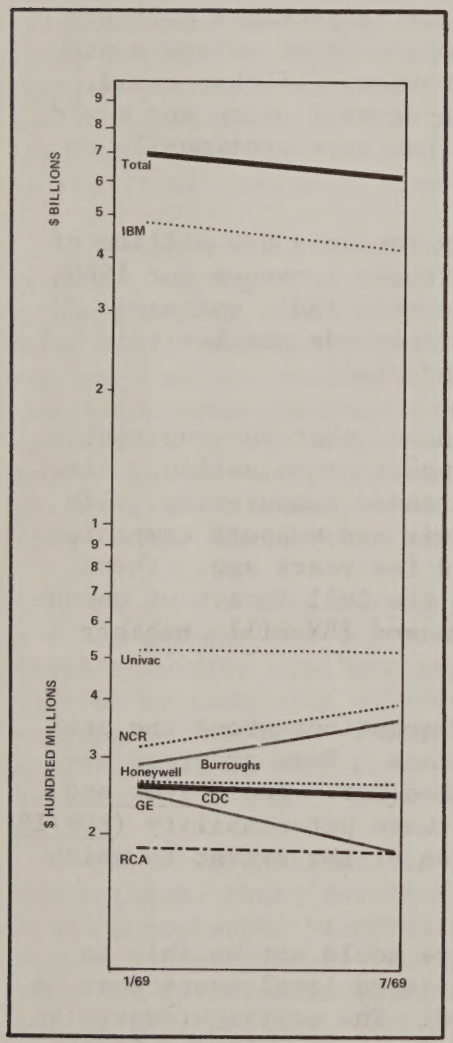
CHARTS AND GRAPHS

Somehow, charts become a necessary part of a summary analysis, especially on about a subject as complex as the computer industry. The details that become clear, even on semi-log charts, simply can not be explained in prose. The two semi-log charts below show the trends in the manufacturers' backlog positions over the first half of 1969 and give an overview of the industry's structure and progress over the last three years.

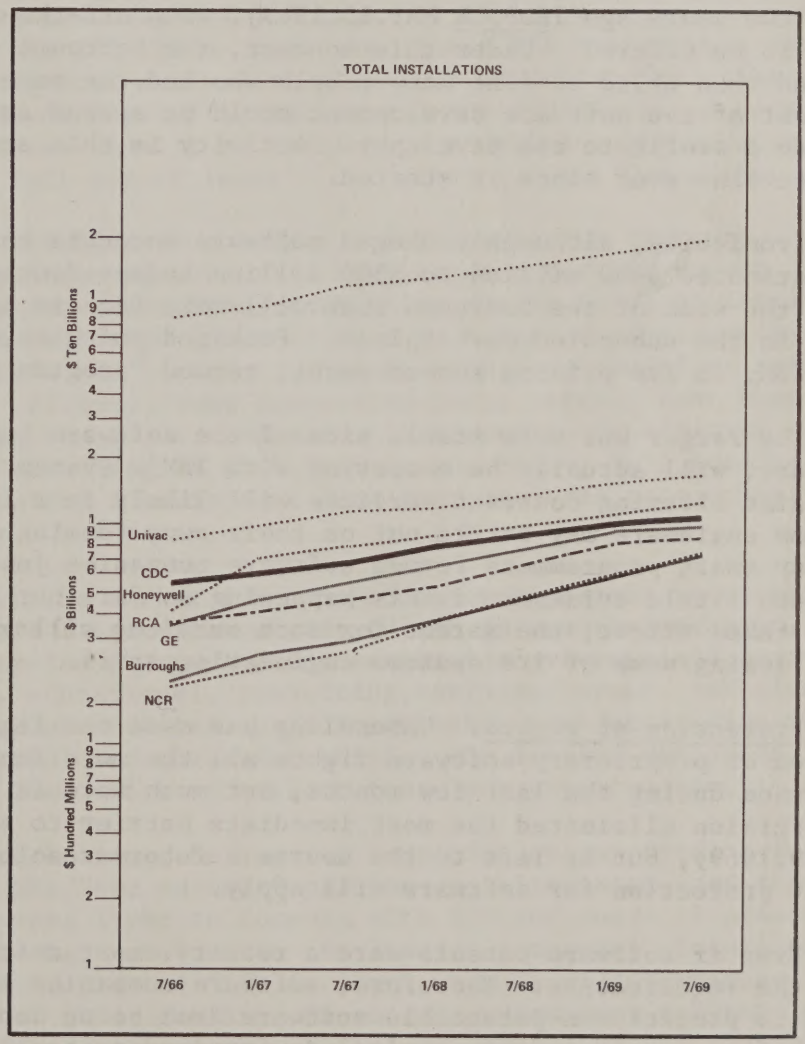
A new trend we see in these charts is the convergence of the lowest six manufacturers towards very similar installation values. Burroughs and NCR, which have the lowest installed values, are growing faster than the others and will probably continue to do so, if their on-order levels are any indication. Univac looks well entrenched in second place in the industry and its order level promises to keep it there.

IBM, of course, is well above any of its competition and seems to be growing faster than the rest. During the first six-months of this year it did increase its market share, but now that unbundling has been made public, IBM's share should drop back to historic levels.

ON-ORDER



TOTAL INSTALLED



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ROUND-UP ON MAJOR COMPUTER INDUSTRY SUBMARKETS

During the first half of 1969, when almost everyone was trying to second guess the nature of IBM's upcoming pricing announcement, there were many fears that many computer industry submarkets would be adversely affected. Indeed, under many possible courses of action, this could well have been the case. But it wasn't. IBM established new pricing policies that, in many ways, make life easier and safer for many segments of the computer industry. The game has new rules, to be sure. And those participants who don't follow the rules may be in trouble. But, for careful companies, the prognosis in general seems promising. Here is a rundown on some of the major computer industry submarkets:

Software

One of the smallest but fastest growing sectors of the computer industry, the market for independent software, didn't really reach importance until the mid-1960s, when shifts from second to third-generation equipment caused more headaches than manufacturers or users could solve themselves. So most manufacturers, and quite a few large users, went to the emerging independent software firms with contracts for solving certain problems or writing certain compilers.

And this contract programming was the extent of the software business until about two years ago (EDP/IR Mar.15,1967), when off-the-shelf or packaged software began to be offered. Under this concept, the software company first solved a problem and then tried to find many people who had the same problem. If they could, the cost of the software development could be spread among several users and would provide a profit to the developer. Activity in this area has been continually on the increase ever since it started.

Ironically, although packaged software accounts today for only $20 million of the estimated $400 million to $500 million independent software revenues for 1969, it is the side of the business that will come face to face with IBM's software might in the unbundled marketplace. Packaged software corresponds precisely to what IBM, in its pricing announcement, termed "program products."

The larger but more stable side of the software business, that for contract software, will actually be competing with IBM's system support organization. Also, companies offering contract services will likely face increased competition. IBM systems engineers may strike out on their own, forming their own support companies the way smart programmers formed software companies just a few years ago. There has been little evidence of this happening so far, but as the full impact of unbundling takes effect, the market for such services will grow and IBM will probably start losing some of its systems engineering staff.

Protection of rights. Unbundling has made the legal questions about the protection of proprietary software rights all the more important. Some progress has been made during the last few months, but much more is asked for. The Prater and Wei decision eliminated the most immediate barrier to software patentability (EDP/IR Aug.29,1969), but it left to the courts a future resolution of the extent to which patent protection for software will apply.

Even if software patents were a reality, most software would not be able to meet the requirements. Therefore, software companies say, some legal means must be found to protect non-patentable software from being copied. The copyright revision bill before Congress does not include improved protection for copyrighted software.

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An important source of suggestions as to remedies to these legal problems is IBM, with its extensive legal staff. It plans to license the use of its copyrighted software products to users and, in that way, expects to curb abuses. Also, IBM is the moving force behind the "software registry" idea, which would offer legal protection somewhere between patent protection and copyright protection and which would be specifically attuned to software's needs. Whatever the final decision, it is clear that there is a pressing need for some type of software protection in the unbundled computer business.

Leasing

During the first half of 1969, there was a sharp decline in leasing company purchases of computer equipment. Earlier, EDP/IR had predicted total 1969 leasing company purchases of IBM equipment to be in the $400 million to $600 million range, down from over $1 billion in 1968. Mid-year reports from the major leasing companies, however, indicate that the reduction has been much sharper than expected and that total purchases during 1969 may be as low as $300 million. It looks as if any major new investments, if there are to be any, will be postponed until IBM announces its new product line.

The profitability of leasing the next IBM product line will depend in large part on the purchase-to-rent ratios set for the new equipment. EDP/IR expects this ratio to be higher than on the original 360 line but IBM's two major announcements of late -- System/3 and the 360/195 -- both have lower P/R ratios than the current 360 line, so IBM's intentions are not at all clear on this point. The System/3 is too small to attract much leasing attention and the 360/195 has a very limited second user market. Thus, it will be attractive to third-party lessors only if the first user will sign a full-payout lease . . . which quite a few might.

In any event, there will probably be a period before any large new purchases. During this time, leasing companies will have to do a certain amount of remarketing, but not really enough to keep their sales staffs busy, by itself. Some have, therefore, begun to market peripherals made by independent companies -- not only to the leasing company's own customers, but to other organizations in the computer-using community. Already, some impressive sales records have been chalked up in this area. Among the major companies, Transamerica is offering Telex tape drives, Greyhound is selling GE disk drives, and MAI -- in a move to get some new business -- is pushing a peripheral line that includes tape drives from Potter and disk drives from Memorex.

Expansion into new areas. The market for independent peripherals is certainly a valid one for leasing companies, but it hardly is enough to sustain momentum. These companies also are aggressively entering the computer services field, setting up or acquiring software, educational, consulting, service bureau, and time-sharing activities. The unbundled computer environment makes such activities more attractive and, with their capital and marketing skills, the leasing companies seem to be in a good position from which to exploit these new opportunities.

IBM's unbundling, far from hurting the leasing companies as expected, actually strengthened their position: The "second user" problem was eliminated, and the leasing companies received a green light to compete with IBM for users of present System/360 equipment. Now, the key question to the leasing companies' future is when IBM is going to obsolete the present 360 line, not when it will terminate second user support. Because of this, leasing companies now are less subject to possible discretionary IBM policies than they were before unbundling.

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Facilities management

With each passing year, the computer industry has become more complicated; likewise, new quirks in the industry have opened additional ways in which the computer user can cut the expense of his operations: For example, he can use independent peripherals; he can lease from a third party; he can go outside for software instead of maintaining a large staff of programmers; he can share a larger computer with several firms and cut hardware expenses. Such a list can get quite long. Still, most users, at least until unbundling, have insisted on relying on the mainframe manufacturer's systems programming support. Why? The trouble and risk involved in investigating, then switching to these cheaper methods usually just isn't worth the savings for any one firm.

It's because of this -- and because several of today's entrepreneurs think this is where the money is -- that companies known as "facilities management" firms have grown up during the last year or so. These companies are aware of the savings mentioned above, and many others. And although the investigation of many alternatives is too expensive for the average single user, it can be done by the facilities management company which handles many customers, charges each a fee, offers the customer lower or constant prices for data processing, and makes a profit.

Facilities management companies, in a nutshell, assume complete responsibility for another organization's data processing requirements under a contract that runs, nominally, for five years. The customer under such a setup only has to worry about running his business, not a data processing operation; the management organization, on the other hand, can make a profit because it is operating a large number of data processing centers and has economies of scale with personnel, equipment, and the like.

The actual techniques used by facilities management companies differ rather dramatically from firm to firm. Some simply walk in and take over a user's computer installation; others restructure the entire operation, in some cases even removing most computing to a central location away from the user's site. At the other extreme, there are companies that claim to be in facilities management but that really are little more than a consultant to the user, assisting in the design and implementation of a DP system but leaving all hardware and personnel problems to the user. There's a whole spectrum of other possible arrangements.

In any event, it is fairly clear that the concept will grow, especially since IBM has announced its entry into "custom contract services." For one thing, there is a real shortage of qualified, talented programmers and analysts, and the management firm will probably bid more for the available talent than the user. And the widespread acceptance of facilities management could have important implications for the whole industry:

- Computer products should become more competitive as both price and quality become important parameters in the selection process.

- Small firms with good, inexpensive products will be in a better position to make sales, and could force major manufacturers to adjust their prices in order to compete.

- If the "big machine" approach (remote use of large-scale computers) is successful, it could be another force against the use of small, on-site computer systems.

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- Widespread use of facilities management could slow down continuing development of new applications, since user contracts are limited to specific jobs, and new functions mean renegotiations.

- Development of management firms that specialize in particular industries could lead to similarities of operation that possibly would remove some competitive edge from the business.

With the expected price increases now that unbundling is here, many computer users are going to be looking for ways to cut corners, and turning to a facilities management organization is sure to be one of them. These types of firms, therefore, will soon have to be considered as a separate feature of the computer industry. The importance of this developing submarket, however, is not known, and will be a measure of the technical and marketing ability of the entrants.

Computing services

The user in the market for computing service from outside his own shop must still turn to one of two types of organization: the off-line or traditional service bureau which usually does batch processing; or the newer, remote-computing operation that offers Rair, or time-shared computing and perhaps remote batch processing. At mid-1969, both types of operation are in themidst of transition.

Traditional service bureaus have rarely been very profitable, but they proliferated anyway because entry was reasonably inexpensive and they provided an easy way for the computer professional to set up and run his own business. Others were founded because large computer users had excess computer time they wanted to sell. In any event, the profit squeeze has continued, and there is a definite move toward consolidation among service bureaus. Also, especially as the resultant operations have more equipment available, there is a trend toward adding on-line services.

Remote batch processing is usually the on-line service that is considered first. This is relatively easy, for the only difference between remote batch and traditional service, essentially, is that the telephone line takes the place of the delivery truck. Many of these bureaus envision the addition of interactive or Rair operations to their service. Some offer or talk about offering time sharing, but smart ones forget it; time sharing usually is even less profitable than batch-processing service bureau operations (EDP/IR June 17,1969).

The computing service operations already on-line seem to be concentrating their efforts in one of two directions not completely different. One promising area is in providing a Rair service in which the computer is a tool and not used for its raw power alone. Reservations systems, stock exchanging systems, and medical facilities management systems are examples of Rair services currently being offered; EDP/IR expects frequent announcements of other such services during the next several years.

Also entering the scene now are the nation-wide computer utilities, which can exploit the economies of scale of large computers and of joint software development. At least seven of these, including three run by major computer manufacturers, are being set up today. These nationwide utilities are designed to spread a diversified computing load over an entire network, thereby keeping response time low and allowing the utilities to accept more customers than a single system. These utilities will operate on low profit margins and should soon make the small, non-specialized time-sharing firms obsolete.

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MONTHLY COMPUTER CENSUS

The number of electronic computers installed or on order at any one time has been increasing rapidly during the past several years. New models come on the computer market, familiar machines go out of production and subsequently are sold on the used machine market or retired from active use and dismantled. Some computers have been received with open arms by users; others have been given the cold shoulder.

To aid our readers in keeping up with this rapidly changing profile of computer use, **EDP Industry Report** publishes this census, with the status of general-purpose electronic digital computers, made by U.S.-based companies, as of the first of each month. Computers with an average system purchase price of less than $25,000 are not included. The figures for total installations are broken down between those in the U.S. and those outside; only the grand total for orders is given. The figures are compiled and updated each month by the International Data Corporation, Newtonville, Mass., a market research firm that specializes in the information processing industry. The census is available only in EDP/IR.

In general, manufacturers in the computer industry do not *officially* release installation and on-order figures. The figures in this census are developed through a continuing market survey conducted by the International Data Corporation. The market research program includes a worldwide computer installation locator file which identifies, by customer, the installation sites of electronic computers. The resulting census counts are submitted to individual computer manufacturers for their review and voluntary confirmation.

We hope the figures in this census will serve as a useful "box-score" of progress for readers interested in following the growth of the U.S. computer industry and of the computing power it builds. Comments from readers are welcome.

AS OF JULY 1, 1969.

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	205	$ 4,600	1/54	16	2	18	X
	220	$ 14,000	10/58	23	4	27	X
	B100	$ 2,800	8/64	77	10	87	X
	B200 Series	$ 5,500	11/61	415	74	489	X
	B300 Series	$ 9,500	7/65	470	103	573	31
	B500	$ 3,800	11/68	41	5	46	55
	B2500	$ 5,000	2/67	116	28	144	81
	B3500	$ 14,000	5/67	126	34	160	170
	B5500	$ 37,500	3/63	99	10	109	14
	B6500	$ 33,000	6/69	5	0	5	56
	B7500	$ 44,000	9/69	0	0	0	15
	B8500	$200,000	4/69	1	0	1	4
Control Data Corp.	G-15	$ 1,600	7/55	240	9	249	X
	G-20	$ 15,500	4/61	15	2	17	X
	LGP-21	$ 725	12/62	123	3	126	X
	LGP-30	$ 1,300	9/56	89	4	93	X
	RPC-4000	$ 1,875	1/61	42	4	46	X
	160*/160A/160G	$2,100/$5,000/$12,000	5/60;7/61;3/64	443	36	479	X
	924/924A	$ 11,000	8/61	26	1	27	X
	1604/1604A	$ 45,000	1/60	43	3	46	X
	1700	$ 3,800	5/66	148	65	213	68
	3100/3150	$ 10,500	12/64	110	22	132	10
	3200	$ 14,000	5/64	41	15	56	X
	3300	$ 28,000	9/65	121	31	152	15
	3400	$ 19,000	11/64	14	4	18	X
	3500	$ 25,000	1/69	7	0	7	19
	3600	$ 52,000	6/63	29	11	40	X
	3800	$ 53,000	2/66	17	3	20	X
	6400/6500	$ 58,000	5/66	59	20	79	22
	6600.	$115,000	8/64	51	14	65	14
	7600	$240,000	1/69	1	0	1	6
Digital Equipment Corp.	PDP-1	$ 3,400	11/60	49	2	51	X
	PDP-4	$ 1,700	8/62	40	5	45	X
	PDP-5	$ 900	9/63	90	10	100	X
	PDP-6	$ 10,000	10/64	18	3	21	X
	PDP-7	$ 1,300	11/64	124	36	160	X
	PDP-8	$ 525	4/65	1195	258	1453	15
	PDP-9/9L	$ 1,100	12/66	276	91	367	21
	PDP-10	$ 11,000	10/67	64	16	80	32
	PDP-15	$ 900	12/69	0	0	0	100
Electronic Associates	640	$ 1,200	9/67	80	32	112	8
	8400	$ 10,000	6/65	19	6	25	1
EMR Computer	ASI 210	$ 3,850	4/62	9	0	9	X
	ASI 2100	$ 4,200	12/63	8	0	8	X
	ADVANCE 6020	$ 4,400	4/65	17	0	17	1
	ADVANCE 6040	$ 5,600	7/65	8	3	11	3
	ADVANCE 6050	$ 9,000	2/66	15	4	19	0
	ADVANCE 6070	$ 15,000	10/65	3	2	5	0
	ADVANCE 6130	$ 1,550	10/67	41	8	49	15
General Electric	105	$ 1,350	7/69	0	0	0	185
	115	$ 2,200	12/65	422	718	1140	105
	130	$ 4,500	3/69	5	8	13	145
	205	$ 2,900	6/64	10	0	10	X
	210	$ 16,000	7/59	28	0	28	X
	215	$ 6,000	9/63	18	2	20	X
	225	$ 8,800	4/61	140	19	159	X
	235	$ 12,500	4/64	121	25	146	2
	405	$ 6,200	2/68	59	15	74	24
	415	$ 11,000	5/64	329	105	434	16
	425	$ 19,500	6/64	126	33	159	21
	435	$ 27,000	9/65	37	9	46	8
	615	$ 40,000	6/69	0	0	0	11
	625	$ 54,000	4/65	25	4	29	5
	635	$ 62,000	5/65	46	6	52	20
	645	$ 90,000	7/66	7	0	7	0
	GE-PAC 4020	$ 5,000	2/67	125	38	163	36
	GE-PAC 4040	$ 3,000	8/64	45	20	65	X
	GE-PAC 4050	$ 7,000	12/66	20	1	21	X
	GE-PAC 4060	$ 8,500	6/65	18	2	20	X
Hewlett-Packard	2000A	$ 2,500	11/68	12	0	12	57
	2005A	$ 1,900	7/69	0	0	0	14

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AS OF JULY 1, 1969

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Honeywell	DDP-24	$ 2,500	5/63	69	2	71	X
	DDP-116	$ 950	4/65	207	44	251	9
	DDP-124	$ 2,150	3/66	47	29	76	6
	DDP-224	$ 3,600	3/65	52	10	62	8
	DDP-516	$ 780	9/66	258	72	330	140
	H-110	$ 2,500	9/68	43	17	60	81
	H-120	$ 4,200	1/66	748	187	935	55
	H-125	$ 7,100	12/67	142	40	182	100
	H-200	$ 9,200	3/64	834	352	1186	55
	H-400	$ 8,500	12/61	48	37	85	X
	H-632	$ 3,500	12/68	15	0	15	34
	H-800	$ 30,000	12/60	57	14	71	X
	H-1200	$ 11,600	2/66	251	65	316	36
	H-1250	$ 12,000	8/68	39	13	52	85
	H-1400	$ 14,000	1/64	7	2	9	X
	H-1800	$ 50,000	1/64	16	4	20	X
	H-2200	$ 18,700	1/66	142	33	175	63
	H-3200	$ 18,000	2/70	0	0	0	14
	H-4200	$ 20,500	9/68	9	0	9	18
	H-8200	$ 50,000	2/69	3	1	4	16
IBM	305	$ 3,600	12/57	46	17	63	X
	360/20	$ 2,900	12/65	6320	4180	10,500	2350
	360/25	$ 7,750	10/68	780	220	1000	3200
	360/30	$ 10,000	5/65	6225	3525	9750	380
	360/40	$ 18,900	4/65	2825	1165	3990	290
	360/44	$ 15,000	7/66	285	60	345	50
	360/50	$ 32,000	8/65	1160	270	1430	590
	360/65	$ 60,000	11/65	545	110	655	252
	360/67	$138,000	6/66	52	12	64	53
	360/75	$ 81,400	1/66	42	8	50	7
	360/85	$155,000	10/69	0	0	0	33
	360/90 Series	$150,000	11/67	17	0	17	2
	650	$ 4,800	11/54	57	21	78	X
	1130	$ 1,700	2/66	3275	1315	4590	1870
	1401	$ 6,200	9/60	2635	1765	4400	X
	1401-G	$ 2,300	5/64	530	550	1080	X
	1401-H	$ 1,300	6/67	220	160	380	X
	1410	$ 17,000	11/61	275	165	440	X
	1440	$ 4,100	4/63	1600	1170	2770	X
	1460	$ 9,800	10/63	552	98	650	X
	1620 I, II	$ 4,000	9/60	795	440	1235	X
	1800	$ 5,000	1/66	470	160	630	233
	7010	$ 26,000	10/63	93	14	107	X
	702	$ 6,900	2/55	2	0	2	X
	7030	$160,000	5/61	5	1	6	X
	704	$ 32,000	12/55	14	2	16	X
	7040	$ 25,000	6/63	63	42	105	X
	7044	$ 36,500	6/63	61	21	82	X
	705	$ 38,000	11/55	25	5	30	X
	7070, 2, 4	$ 27,000	3/60	146	81	227	X
	7080	$ 60,000	8/61	75	3	78	X
	709	$ 40,000	8/58	2	0	2	X
	7090	$ 63,500	11/59	26	6	32	X
	7094 I/II	$ 77,300	9/62;4/64	170	11	181	X
National Cash Register	NCR-304	$ 14,000	1/60	18	2	20	X
	NCR-310	$ 2,500	5/61	9	0	9	X
	NCR-315	$ 9,000	5/62	420	370	790	16
	NCR-315-RMC	$ 11,800	9/65	106	27	133	12
	NCR-390	$ 1,950	5/61	415	215	630	X
	NCR-500	$ 1,650	10/65	1940	885	2825	180
	Century-100	$ 4,600	9/68	122	14	136	1050
	Century-200	$ 6,500	6/69	3	0	3	450
Philco	1000	$ 7,010	6/63	13	1	14	X
	2000-210, 211	$ 40,000	10/58	12	1	13	X
	2000-212	$ 52,000	1/63	12	1	13	X
RCA	RCA 301	$ 7,500	2/61	385	200	585	X
	RCA 3301	$ 19,000	7/64	75	8	83	X
	RCA 501	$ 14,000	6/59	70	2	72	X
	RCA 601	$ 35,000	11/62	4	0	4	X
	Spectra 70/15	$ 4,500	9/65	110	80	190	14
	Spectra 70/25	$ 7,200	9/65	75	40	115	7
	Spectra 70/35	$ 8,400	1/67	125	84	209	75
	Spectra 70/45	$ 24,000	11/65	243	85	328	38
	Spectra 70/46	$ 33,400	11/68	15	0	15	24
	Spectra 70/55	$ 35,000	11/66	17	3	20	13
	Spectra 70/60	$ 38,000	9/70	0	0	0	6
Raytheon	250	$ 1,200	12/60	108	43	151	X
	440	$ 3,500	3/64	16	2	18	X
	520	$ 3,200	10/65	22	3	25	X
Scientific Control Corp.	655	$ 1,800	10/66	100	0	100	12
	660	$ 2,000	10/65	94	11	105	32
	4700	$ 800	4/69	9	0	9	92
	6700	$ 16,000	11/69	0	0	0	2
Scientific Data Systems	SDS-92	$ 1,500	4/65	60	5	65	X
	SDS-910	$ 2,000	8/62	168	15	183	X
	SDS-920	$ 2,900	9/62	135	19	154	X
	SDS-925	$ 3,000	12/64	20	2	22	X
	SDS-930	$ 3,400	6/64	140	19	159	X
	SDS-940	$ 25,000	4/66	51	4	55	19
	SDS-9300	$ 8,500	11/64	29	2	31	X
	Sigma 2	$ 1,800	12/66	191	39	230	110
	Sigma 5	$ 7,000	8/67	84	33	117	56
	Sigma 7	$ 13,500	12/66	64	18	82	23
Standard Computer Corp.	IC6000	$ 18,000	5/67	15	0	15	5
	IC4000	$ 10,000	9/68	6	0	6	6
Systems Eng Labs	810	$ 1,000	9/65	22	2	24	X
	810 A/B	$900/$1,100	8/66;12/68	168	11	179	6
	840	$ 1,400	11/65	3	0	3	X
	840 A/MP	$1,400/$1,600	8/66;10/67	59	0	59	5
UNIVAC	I & II	$ 25,000	3/51 & 11/57	15	0	15	X
	III	$ 21,000	8/62	68	13	81	X
	File Computers	$ 15,000	8/56	7	0	7	X
	SS 80, 90 & Step	$ 8,000	8/58	93	65	158	X
	418	$ 11,700	6/63	101	52	153	11
	490 Series	$ 32,000	12/61	185	27	212	18
	1004	$ 1,900	2/63	1605	945	2550	X
	1005	$ 2,550	4/66	960	430	1390	20
	1050	$ 8,800	9/63	160	80	240	X
	1101-1105	$ 35,000	12/50	6	0	6	X
	1106	$ 37,000	2/70	0	0	0	15
	1107	$ 57,000	10/62	18	8	26	X
	1108	$ 68,000	9/65	152	57	209	101
	9200	$ 1,600	6/67	341	113	454	460
	9300	$ 4,800	9/67	190	65	255	365
	9400	$ 7,000	5/69	9	0	9	120
	LARC	$135,000	5/60	1	0	1	X
			Totals	48,666	22,618	62,588	14,818

X = no longer in production.

* To avoid double counting, note that the Control Data 160 serves as the central processor of the NCR 310. Also, customers ordering a new computer model intended to replace a computer model in the same product line may continue to use much of their current peripheral equipment, which can account for 30-70% of the value of the total computer system.

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August 25, - September 5, 1969

NEW YORK STOCK EXCHANGE	1969 High	1969 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
Addressograph-Multigraph	82 3/4	59 1/2	1497	73 5/8	67 1/4	73 5/8	+ 5 5/8	+ 7.10
+American R & D	60 1/4	44	1151	60 1/4	54 1/8	56 3/4	- 1/8	- 0.22
Ampex Corp.	44 3/4	32 1/2	1171	42 5/8	40 1/8	40 7/8	- 1/2	- 1.21
Bunker Ramo	17 5/8	9 1/2	1563	12 3/8	10 5/8	10 5/8	- 1/2	- 4.49
Burroughs	153 1/8	120 3/4	1590	153 1/8	140 1/4	147	+ 1	+ 0.69
Collins Radio	69 3/4	38 5/8	604	43 1/4	39 5/8	40 7/8	- 1 1/2	- 3.54
Computer Sciences	30 7/8	19 3/4	1292	22 1/4	20 3/4	21	- 1/4	- 1.18
Control Data	159 1/4	125 1/8	1970	153	144 3/4	147	- 3	- 2.00
Electronic Assoc.	25 1/4	13 1/4	391	16 7/8	14 7/8	15 3/8	- 1/8	- 0.81
General Electric	98 1/4	81 1/4	1776	85 3/8	81 5/8	81 5/8	- 3 1/8	- 3.69
Granite Computer	25 3/8	15	417	15 7/8	15 3/8	15 3/8	- 1/4	- 1.50
Honeywell	140 3/4	107 3/4	584	138 1/2	130 1/4	130 1/2	- 7 7/8	- 5.69
IBM	354 1/2	291 3/4	1866	349 7/8	336 1/4	338	-12 1/4	- 3.50
ITT	58 1/2	46 1/4	1963	54 3/8	51 7/8	52	- 1 1/4	- 2.35
Leasco	54	23 1/8	4976	27 1/4	23 7/8	24	- 3 1/2	-12.73
Litton	74 1/2	37 1/8	4203	48 7/8	43 3/4	45 1/2	+ 1 1/2	+ 3.41
Memorex	94 7/8	65	845	93 1/2	86 1/2	88	- 6	- 6.38
National Cash Register	139 3/8	108	1377	137 3/4	126 1/2	134 1/2	+ 1 5/8	+ 1.22
RCA	48 1/8	35 1/2	2023	38 5/8	36 1/4	37 1/4	- 1 3/8	- 3.56
Raytheon	50 1/4	30 5/8	1392	36 3/8	33	35 3/4	+ 1	+ 2.72
Sanders	61 7/8	22 5/8	1079	27 1/4	24	24 3/8	- 1 3/8	- 5.34
SCM	47 1/8	28	822	34 1/8	30 1/4	30 1/2	- 3 1/8	- 9.29
Singer	84 1/4	62	719	69 1/4	65	66 3/8	- 2 3/8	- 3.45
Sperry Rand	55 1/2	38 3/8	2808	45 3/8	42 1/8	42 1/8	- 2 3/8	- 5.34
Teledyne	45 1/2	28 1/4	3175	37	32 3/8	32 1/2	- 1 3/4	- 5.11
University Computing	73 5/8	66 3/8	865	73 5/8	66 3/8	67 3/8	- 3 7/8	- 5.45
Xerox	100 1/2	85 1/4	3055	98	92 1/2	92 1/4	- 5	- 5.14
NYSE COMPUTER STOCK AVERAGE							- 1.80	- 2.95
+ Stock Split								
AMERICAN STOCK EXCHANGE								
Applied Data Research	32 7/8	23 1/4	167	25	23 1/4	24	- 3/4	- 3.03
Automatic D P	83 7/8	63 1/4	72	83 7/8	78 1/2	81	+ 1 1/4	+ 1.20
Calcomp	37 1/2	18 1/4	253	24 7/8	22 3/8	24	+ 1/4	+ 1.05
Clary Corp.	25 3/4	10 1/8	277	12 1/8	10 1/8	10 1/8	- 1 5/8	-13.83
Computer Applications	21 7/8	9 1/2	140	13 3/8	11	11 3/4	- 1 5/8	-12.15
Computing and Software	56 1/2	37	188	55 3/4	51 1/4	51 1/2	- 1 1/2	- 2.83
Data Proc. Fin. & Gen.	60 1/4	23 5/8	420	30	26 5/8	26 5/8	- 1	- 3.62
Data Products	27 7/8	12 3/8	1218	15 5/8	13 1/4	13 1/4	- 1 5/8	- 4.92
Digital Equipment	75 3/4	54 1/2	1418	75 3/4	67	69 7/8	- 3	- 4.12
DPA, Inc.	12	9	211	10	9 1/8	9 5/8	- 1/8	- 1.28
Greyhound Computer	28 5/8	12 5/8	148	14 3/8	13	13	- 1 1/8	- 7.96
ITEL	24 5/8	14 7/8	155	16 7/8	14 7/8	15 1/8	- 1 5/8	- 9.70
Levin-Townsend Comp.	57 1/2	24	621	28 3/4	25	25	- 2 1/4	- 8.26
Milgo Elect.	34 1/2	17 7/8	455	26 5/8	22 5/8	24	+ 3/4	+ 3.23
Mohawk Data Sciences	89 1/8	59 3/4	912	88 7/8	84	84 1/8	- 4 1/8	- 4.67
Planning Research	34 7/8	23 7/8	401	34 1/2	32	33 1/4	- 5/8	- 1.85
Potter Instrument	35 3/4	23 3/4	392	32 1/4	29 3/8	30 5/8	+ 5/8	+ 2.08
Randolph Computers	43 7/8	18	1630	35 5/8	30 5/8	34 1/2	+ 3 3/8	+ 8.91
Sys. Eng. Labs.	39 1/4	26 1/8	668	38 7/8	35 1/8	35 3/8	- 3 1/4	- 8.41
Telex	55 3/4	20 3/4	2335	55 3/4	47 5/8	50 7/8	+ 1/2	+ 0.99
AMSE COMPUTER STOCK AVERAGE							- 0.88	- 3.46

OVER-THE-COUNTER	1969 High Bid	1969 Low Bid	Sept. 5, Bid	Sept. 5, Asked	2 weeks ago Bid	2 week net change Bid	2 week % change Bid
Aries Corp.	19	6	7 1/2	8	8 1/4	- 3/4	- 9.09
Bolt, Beranek & Newman, Inc.	19	7 1/2	10 1/4	11 1/4	12 1/2	- 2 1/4	-18.00
Computer Usage	40	7 3/4	8 3/4	9 1/2	8	+ 3/4	+ 9.38
Cyber-tronics	12 1/2	7	8 1/8	8 5/8	9 1/2	- 1 3/8	-14.47
Digitronics	22 1/2	13 1/2	16	17	19	- 3	-15.79
Fabri-Tek	12 7/8	7 1/2	8 1/2	9	8 5/8	- 1/8	- 1.45
Informatics, Inc.	30 1/4	17 1/2	17 1/2	18 1/2	23 5/8	- 6 1/8	-25.93
LMC Data, Inc.	8 1/4	3 1/2	3 1/2	4	3 5/8	- 1/8	- 3.45
Management Assistance	14 7/8	3 3/4	3 7/8	4 1/4	5 1/8	- 1 1/4	-24.39
Optical Scanning Corp.	118	50	57	60	57	--	--
Recognition Equipment, Inc.	76	52	57 1/2	59	64 1/2	- 7	-10.86
Tally Corp.	36	15	20	21	20	--	--
TBS Computer Centers Corp.	36	11	18	20	18 1/2	- 1/2	- 2.70

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EDP industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" OCTOBER 9,1969 • VOL.5,NO.2 P.J.McGOVERN,EDITOR

Exclusive Report -- The *EDP 100*

SELECT GROUP OF 100 U.S. CORPORATIONS HAVE OVER 40% OF COMPUTER SYSTEMS WITHIN INDUSTRIAL FIRMS

Concentration is the name of the game in the computer industry, as it is in others.

In terms of output, the top four computer manufacturers accounted for 86% of the computers shipped during 1968. (EDP/IR, March 25,1969) By comparison, the top four manufacturers of telephone apparatus produced 94% of the shipments of that product in 1966; motor vehicles, 79%; aircraft, 67%. On the other hand, the four largest producers of soft drinks shipped only 14% of that product, and concrete, only 5%. (Statistical Abstract of the U.S., 1969)

Computer usage is also highly concentrated among a relatively small number of firms. Whereas a cookie manufacturer might have a potential market of close to 200 million people, a computer manufacturer can do very well if he sells to just 100 large computer users. A mere 0.4% of the computer customers in the U.S. operate computing systems worth $3.30 billion, or over 15% of such equipment controlled by U.S. based organizations. Indeed, among industrial firms (which account for 42.5% of the value of computers used by U.S. based non-governmental organizations) this select group of 100 controls some 43.4% of the installed computing systems.

These figures have resulted from a four-month-long study of the value of computing equipment owned or leased by the 500 largest industrial corporations in the United States. The study -- conducted by EDP Industry Report in conjunction with the International Data Corporation, publisher of this newsletter -- is similar to one published a year ago (EDP/IR, Sept. 27,1968). Results of the current study, including the roster of the *EDP 100*, appear on pages 4-6 of this issue.

Selection of the *EDP 100*

Industrial corporations large in terms of sales volume, i.e. those listed in Fortune magazine's May 15, 1969 issue, were contacted. In addition, a few private companies known to be large computer users were queried. The value of installed computing equipment is calculated on the basis of new equipment cost and is based on returns from the companies themselves and/or on other information available to us from the International Data Corporation.

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Aries Corp.
Bolt, Beranek & New.
Computer Usage
Cyber-tronics

Digitronics	22 1/2					
Fabri-Tek	12 7/8					
Informatics, Inc.	30 1/4	17 1/2				
LMC Data, Inc.	8 1/4	3 1/2				
Management Assistance	14 7/8	3 3/4				
Optical Scanning Corp.	118	50	57	60		
Recognition Equipment, Inc.	76	52	57 1/2	59		86
Tally Corp.	36	15	20	21		
TBS Computer Centers Corp.	36	11	18	20	18 1/2	2.70

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:o qualify as an industrial firm, and thus be included, a company must have ved at least 50% of its revenue from manufacturing or mining during its recent fiscal year. Thus AT&T, a utility, does not qualify, even though it ie largest user of computers outside the federal government. However, West-Electric, AT&T's manufacturing affiliate, is included in the *EDP 100* as er 13 with $60.67 million of installed computers.

Companies which manufacture computers present a real dilemma. While these ms use computers in ways similar to other manufacturers -- to handle payroll, ventory, and production control -- they also employ their computers in product velopment, programming, and sales support. Where considered feasible, those mputers used for the latter applications have been eliminated from the company's otal, and the remainder presented in the tabulation. Certain companies, how-ver . . . companies such as IBM and Control Data . . . derive such a large por-ion of their business from the manufacture and sale, or lease of computer sys-:ems or services, that they have simply been omitted.

It should also be noted that this policy of excluding computers used by one company to help solve other companies' problems -- those used in a service-bureau or time-sharing environment -- has been applied to all firms. The computer val-ues listed represent equipment used for internal data processing only.

Interpretation

In addition to simply listing the 100 largest computer users, we have pre-sented pertinent financial data (taken from Fortune May 15,1969 and other widely used sources) and have calculated several ratios to assist the reader in making his own analysis. Tables II, III, and IV give the value of computers for each $1000 in sales, for each $1000 in assets, and per employee . . . for each of eleven industry groups. The results of the various measures of computer usage are different, as the bar charts illustrate, but they should serve as useful yardsticks.

Keeping in mind that no one simple calculation or ratio will prove that an organization must abound in computers before it can be successful, here are some of the more general findings that can be derived from a study of the data in tables I-IV.

- The Electrical/Electronics companies, including several computer manufacturers, account for the largest portion of installed computers. (Table I) Industries with a high value of computers installed tend, of course, to be the big industries in terms of sales or assets. As mentioned previously, certain industries -- the automotive and aerospace, particularly -- tend to have fewer major participants, and more "giants", and thus, a good part of the computers used in those industries are represented in the *EDP 100*.

- The distribution of computer value by sales and/or assets (Tables II & III) probably offers the greatest possibility for analysis. The aerospace industry, with an average value per $1000 sales of $30.20, and $60.32 per $1000 assets, is virtually in a class by itself. It is technically very advanced, while many of its high-priced computers are supported by the U.S. government. (It should be noted that one CDC 6600 is worth about the same, for the purposes of this study, as 2 IBM 360/65s, or 12 IBM 360/30s, or 40 IBM 360/20s.) Also, ranking

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Optical Scanning Corp.			
Recognition Equipment, Inc.	76		
Tally Corp.	36	15	
TBS Computer Centers Corp.	36	11	18

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high are the Electrical/Electronics companies, which are likely more familiar with the advantages of using electronic data processing. (Note: only the computers used for internal data processing have been included in the *EDP 100* figures.) Also ranking relatively high in one or both of the Sales/Assets tables are the automotive, consumer, and "other" industries.

- When the value of computers per employee (Table IV) is examined, the aerospace industry again ranks high with a $758 figure. The petroleum industry, which leads all industries in terms of capital intensiveness ($76,551 sales per employee), also has a high ratio of computers per employee: $695. Following these two are Electrical/Electronic with a $409 ratio and Paper (also capital intensive) with $374.

It should be pointed out that Tables II-IV have a column labeled "Ratio: Industry/Average." These ratios compare each industry to the average for all 100 companies. Table II, for example, shows that the automotive industry has only 73% as much computing equipment per $1000 sales as the "average" company in the top 100, while the aerospace industry has 2.16 times as much as the average.

Comparison with *EDP 100*-1968

Despite the fact that the value of computers controlled by *EDP 100* firms has increased 20%, from $2.7 billion to $3.3 billion, the group now controls only 15% of all computers used by U.S. based organizations, down from 17% in 1968. This increase in the actual value of computers installed does compare favorably, however, with a 14% increase in sales and assets, and a 13% increase in employees of the *EDP 100* firms.

It should be noted that the composition of the *EDP 100* has changed somewhat from last year. Sixteen new firms have been added, and thus, 16 have been dropped. Those added include: Ling-Temco-Vought (in nineteenth place with $49.32 million worth of computers installed); National Cash Register (#32, with $30.00M); TRW (#33, $29.88M); Honeywell (#41, $24.75M); Textron (#42, $24.70M); Caterpillar Tractor (#45, $23.42); Avco (#49; $21.20M); Burroughs (#54, $17.91M); Combustion Engineering (#58, $16.19M); Philip Morris (#68, $12.52M); Babcock & Wilkox (#76, $11.64M); J.P. Stevens (#81, $10.82M); Gulf & Western Industries (#86, $10.32M); Firestone Tire & Rubber (#88, $10.19M); Proctor & Gamble (#90, $10.00M); and the 3M Company (#95, $9.70M).

As a result of the inclusion for the first time of the companies mentioned above, as well as the previously noted 20% growth in the value of computers among *EDP 100* firms, the minimum value of computers required for listing, i.e. the value of the #100 firm's computers, increased from $5.69M (Anheuser-Busch) in 1968 to $9.36M (National Dairy Products) in 1969.

Reflecting the growing importance of conglomerates, the number of firms in the "other" category has risen from 9 to 16. Ling-Temco-Vought, for example, replaces a listing for subsidiary, Jones & Laughlin Steel. The addition of Burroughs, Honeywell, and NCR caused the number of Electrical/Electronics firms to rise to 16, while the number of Food/Beverage firms, which generally rank low in the *EDP 100*, dropped from 7 to 3.

We hope that the data in this report will help readers compare their own companies with others in their own and other industries. Such an exercise should prove interesting, if not profitable.

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Optical Scanning Corp.	11		
Recognition Equipment, Inc.	76	-	
Tally Corp.	36	15	
TBS Computer Centers Corp.	36	11	18

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NAME	RANK BY VALUE COMPUTER	VALUE COMPUTERS INSTALLED ($ MILLION)	RANK BY SALES SIZE	1968 SALES ($ MILLION)	VALUE COMPUTERS $1000 SALES	NO. EMPLOYEES (1000)	VALUE COMPUTERS EMPLOYEE	SALES EMPLOYEE	ASSETS ($ MILLION)	VALUE COMPUTERS $1000 ASSETS	% PROFITS	INDUS-TRY GROUP+
General Motors	1		1	$22,755		757		$ 30,059	$ 14,010	$	7.6	A
General Electric	2		4	8,382		400		20,955	5,744		4.3	E
Boeing	3		18	3,274		142		23,056	2,186		2.5	S
Ford Motor Co	4		3	14,075		415		33,915	8,953		4.5	A
McDonnell-Douglas	5		14	3,609		125		28,872	1,335		2.6	S
Lockheed	6		35	2,217		95		23,336	937		2.0	S
Westinghouse	7		17	3,296		138		23,884	2,271		4.1	E
Sperry Rand	8		53	1,563		101		15,475	1,095		4.1	E
Shell Oil	9		16	3,317		39		85,051	4,239		9.4	P
North Am Rockwell	10		29	2,640		114		23,157	1,362		2.8	S
Chrysler	11		5	7,745		231		33,528	4,398		3.9	A
General Dynamics	12		27	2,662		101		26,356	866		1.5	S
Western Electric	13		12	4,032		177		22,779	2,722		4.8	E
RCA	14		20	3,106		125		24,848	2,365		5.0	E
Standard Oil (N J)	15		2	14,091		151		93,317	16,786		9.1	P
Du Pont	16		15	3,481		114		30,535	3,289		10.7	C
Mobil Oil	17		7	6,221		78		79,756	6,871		6.9	P
U S Steel	18		10	4,537		201		22,572	6,391		5.6	I
Ling-Temco-Vought	19		25	2,770		115		24,086	2,648		1.3	M
General Telephone	20		21	2,927		161		18,180	6,157		9.5	E
Gulf Oil	21		9	4,559		60		75,983	7,498		13.7	P
Standard Oil (Ind)	22		19	3,214		48		66,958	4,737		9.6	P
ITT	23		11	4,066		293		13,877	4,022		4.7	E
United Aircraft	24		33	2,408		76		31,684	1,358		2.5	S
Martin Marietta	25		145	682		27		25,259	642		5.9	S
Union Carbide	26		26	2,686		100		26,860	3,208		5.8	C
Singer	27		43	1,754		135		12,992	1,408		4.0	Y
Eastman Kodak	28		28	2,644		108		24,481	1,361		14.2	C
Sun Oil Co	29		42	1,778		29		61,310	2,363		9.2	P
Texaco	30		8	5,460		78		70,000	8,687		15.3	P
Standard Oil (Cal)	31		13	3,634		48		75,708	5,770		12.4	P
NCR	32		86	1,102		91		12,109	1,118		3.3	E
TRW	33		57	1,488		80		18,600	882		4.9	S
Bethlehem Steel	34		23	2,863		131		21,854	3,060		5.6	I
Xerox	35		109	896		28		32,000	906		13.0	E

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LMC Data,
Management Assis

Optical Scanning Corp.	116		
Recognition Equipment, Inc.	76	-	
Tally Corp.	36	15	
TBS Computer Centers Corp.	36	11	18

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NAME	RANK BY VALUE COMPUTER	VALUE COMPUTERS INSTALLED ($ MILLION)	RANK BY SALES SIZE	1968 SALES ($ MILLION)	VALUE COMPUTERS $1000 SALES	NO. EMPLOYEES (1000)	VALUE COMPUTERS EMPLOYEE	SALES EMPLOYEE	ASSETS ($ MILLION)	VALUE COMPUTERS $1000 ASSETS	% PROFITS	INDUS-TRY GROUP+
Grumman Aircraft	36		80	$ 1,152		36		$ 32,000	$ 354		1.7	S
Int'l Harvester	37		31	2,540		106		23,962	1,902		3.0	A
Raytheon	38		79	1,158		52		22,269	466		2.6	E
General Tire & Rubber	39		97	1,039		46		22,586	813		4.2	R
Goodyear Tire & Rubber	40		22	2,926		120		24,383	2,377		5.1	R
Honeywell	41		72	1,281		74		17,310	987		3.9	E
Textron	42		47	1,704		72		23,666	892		4.3	M
Burlington Industries	43		52	1,619		83		19,506	1,193		4.9	Y
Bendix	44		64	1,389		68		20,426	905		3.2	E
Caterpillar Tractor	45		46	1,707		61		27,983	1,507		7.1	A
Atlantic Richfield	46		61	1,414		20		70,700	2,451		10.5	P
Dow Chemical	47		50	1,652		47		35,148	2,312		8.5	C
Phillips Petroleum	48		37	2,107		35		60,200	2,889		6.5	P
Avco	49		78	1,183		50		23,660	1,825		4.8	M
Litton Industries	50		40	1,855		107		17,336	1,208		3.2	M
Monsanto	51		41	1,793		60		29,883	1,895		6.1	C
Tenneco Inc	52		39	2,063		62		33,274	3,888		8.1	C
Weyerhauser	53		98	1,033		38		27,184	1,065		10.2	L
Burroughs	54		156	658		45		14,622	772		6.7	E
Motorola	55		128	775		41		18,902	498		3.6	E
B F Goodrich	56		82	1,140		48		23,750	1,035		3.9	R
Alcoa	57		67	1,353		47		28,787	2,192		7.7	I
Combustion Engineering	58		152	665		26		25,576	501		3.3	M
Owens-Illinois	59		81	1,152		61		18,885	1,162		4.8	M
J Deere Co	60		99	1,030		42		24,523	1,377		4.1	A
Uniroyal	61		60	1,429		68		21,014	1,121		4.0	R
Cities Service	62		59	1,440		23		62,608	1,872		8.4	P
Northrop	63		199	485		25		19,400	400		3.2	S
Sinclair Refining	64		58	1,465		20		73,250	1,851		5.2	P
Continental Oil	65		34	2,251		34		66,205	2,537		6.7	P
Time Inc	66		175	568		10		56,800	514		5.7	Y
McGraw Hill	67		253	368		13		28,307	307		7.6	Y
Philip Morris	68		147	675		20		33,750	787		7.2	Y
Mead	69		108	897		23		39,000	720		3.5	L
Int'l Paper	70		54	1,562		54		28,925	1,714		6.4	L

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Recognition Equ
Tally Corp.
TBS Computer Centers Corp. 36

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NAME	RANK BY VALUE COMPUTER	VALUE COMPUTERS INSTALLED ($ MILLION)	RANK BY SALES SIZE	1968 SALES ($ MILLION)	VALUE COMPUTERS $1000 SALES	NO. EMPLOYEES (1000)	VALUE COMPUTERS EMPLOYEE	SALES EMPLOYEE	ASSETS ($ MILLION)	VALUE COMPUTERS $1000 ASSETS	% PROFITS	INDUSTRY GROUP+
Allied Chemical	71		73	$ 1,278		36		$ 35,500	$ 1,495		1.4	C
Union Oil of Cal	72		55	1,536		17		90,352	2,298		9.8	P
Kaiser Alum & Chem	73		117	850		28		30,357	1,371		6.1	I
General Foods	74		44	1,740		37		47,027	1,045		5.9	F
Texas Instruments	75		148	671		47		14,276	429		3.9	E
Babcock & Wilcox	76		157	647		32		20,218	516		3.9	M
Hercules	77		137	718		35		20,514	799		7.4	C
W R Grace	78		45	1,738		69		25,188	1,678		1.9	C
Armco Steel	79		66	1,375		45		30,555	1,633		6.4	I
Genesco	80		103	1,008		66		15,272	445		3.2	Y
J P Stevens & Co	81		106	963		49		19,653	649		3.3	Y
Inland Steel	82		91	1,074		30		35,800	1,175		7.4	I
Olin Mathieson	83		104	1,002		31		32,322	991		7.5	C
Borg Warner	84		105	975		38		25,657	781		4.8	M
Eaton Yale & Towne	85		111	890		41		21,707	623		5.5	M
Gulf & Western Ind.	86		09	1,313		75		17,506	2,055		5.3	M
Corning Glass	87		204	479		26		18,423	464		9.8	M
Firestone Tire & Rubber	88		36	2,131		102		20,892	1,882		6.0	R
Allis-Chalmers	89		130	767		31		24,741	706		-	E
Proctor & Gamble	90		30	2,543		42		60,547	1,612		7.9	F
Charles Pfifzer & Co	91		134	726		26		27,923	735		15.4	C
FMC	92		65	1,376		54		25,481	974		5.5	M
American Standard	93		90	1,075		63		17,063	949		2.8	M
Avon Products	94		178	559		18		31,055	332		12.8	Y
Minn Mining & Manuf	95		62	1,405		58		24,224	1,163		11.5	M
Whirlpool	96		122	826		20		41,300	414		4.4	Y
Studebaker-Worthington	97		140	710		28		25,357	602		3.4	M
Standard Oil (Ohio)	98		139	716		15		47,733	773		9.8	P
Continental Can	99		56	1,508		48		31,416	1,073		5.5	M
Nat'l Dairy Prod	100		32	2,428		47		51,629	948		3.1	F
				$237,024	$ 12.95	8,086	405	$29,312	$219,638	$15.05		

+CODES FOR CLASSIFICATION BY PRIMARY INDUSTRY GROUP AMONG TOP 100 U.S. INDUSTRIAL COMPUTER USERS

Aerospace . . . . . S
Automotive & Related. . . . . A
Chemicals C
Consumer Products/Services. . . Y
Electrical/Electronics . . . . . E
Food & Beverage. . . . . F
Paper. L
Petroleum. . . . . P
Primary Metals I
Rubber . . . . . R
Other General Industrial . . . . M

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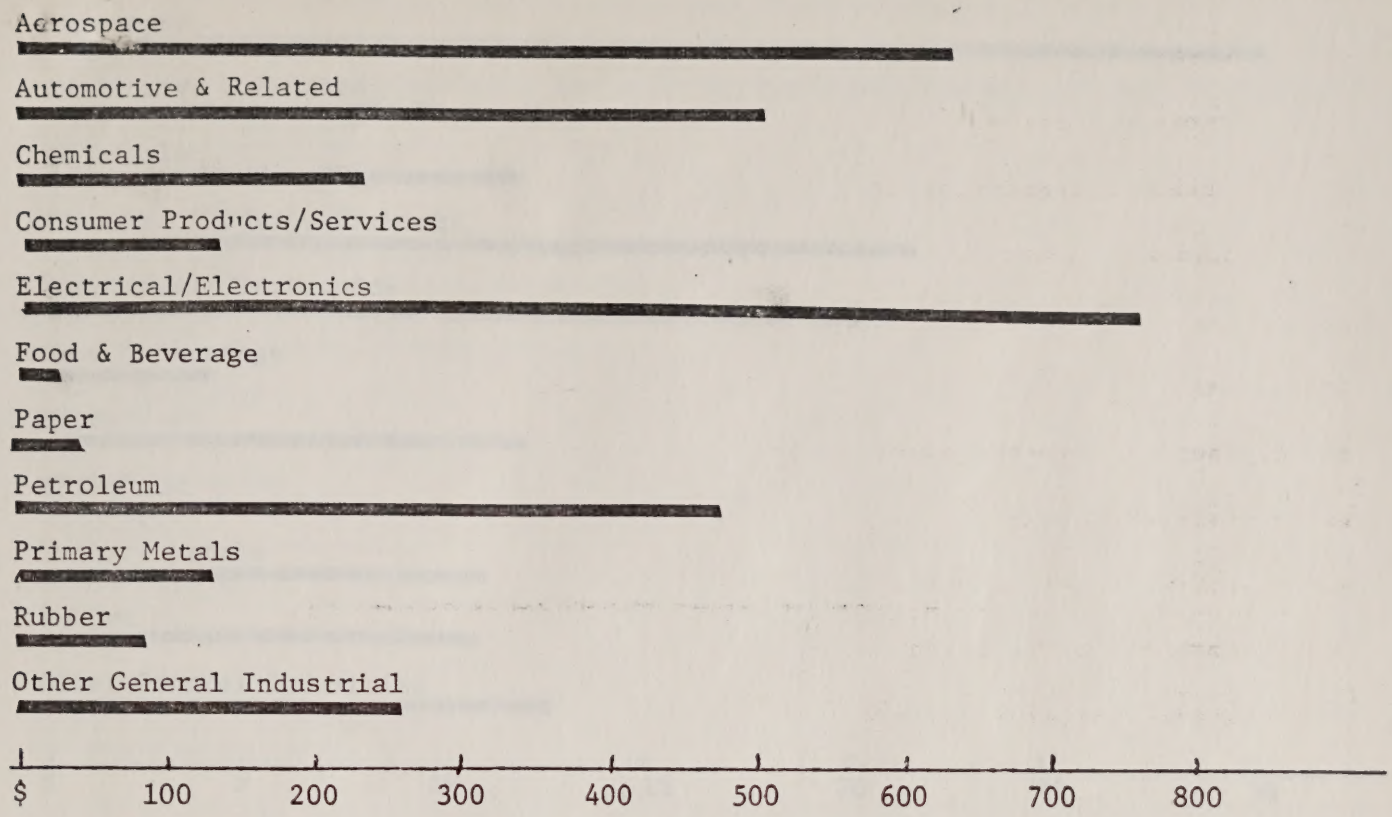
TABLE I DISTRIBUTION OF COMPUTER VALUE WITHIN INDUSTRY GROUPS



Industry Group	Number of Companies	Original Value of Installed Computers ($ Millions)	Average Sales Per Employee	% Total Value of Computers
Aerospace	10	$ 622.62	$ 25,112	18.9%
Automotive	6	501.65	30,925	15.2
Chemicals	11	238.37	28,774	7.2
Consumer	9	138.96	20,972	4.2
Elec./Elec.	16	765.05	19,896	23.1
Food & Bev.	3	31.90	50,605	1.0
Paper	3	43.10	30,365	1.3
Petroleum	15	483.06	76,551	14.6
Metals	6	130.35	25,089	3.9
Rubber	5	93.46	23,170	2.8
Other	16	258.01	22,031	7.8

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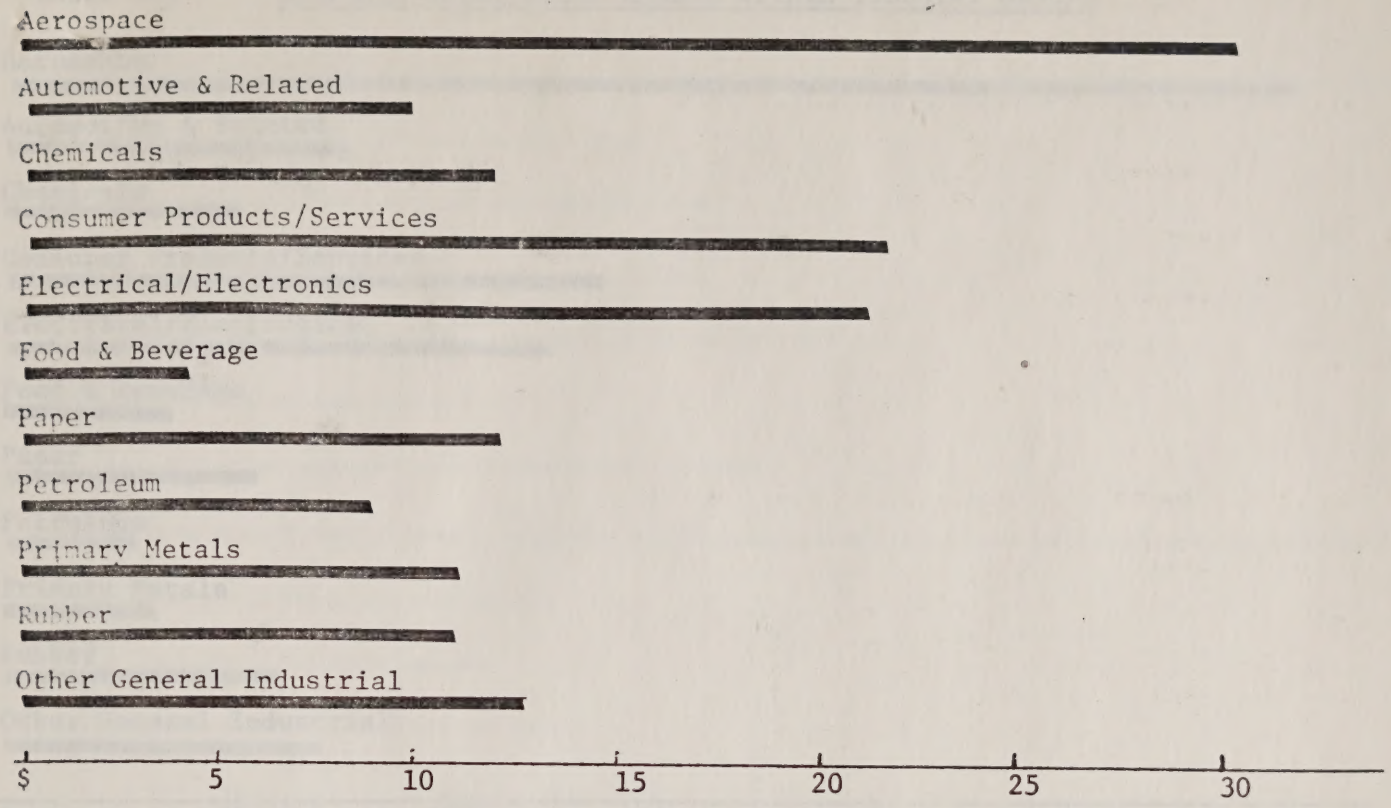
TABLE II COMPUTER VALUE/$1000 SALES WITHIN INDUSTRY GROUPS



Industry Group	Number of Companies	Value of Computers/$1000 Sales High	Low	Average	Ratio: Industry/ Average
Aerospace	10	$ 49.94	$ 17.23	$ 30.20	2.16
Automotive	6	15.06	8.76	10.06	0.73
Chemicals	11	16.10	6.62	11.97	0.86
Consumer	9	37.45	8.62	21.58	1.55
Elec./Elec.	16	54.38	10.40	21.21	1.52
Food & Bev.	3	6.74	3.86	4.75	0.34
Paper	3	17.84	7.87	12.34	0.88
Petroleum	15	25.32	4.13	9.08	0.65
Metals	6	13.98	8.33	10.81	0.77
Rubber	5	25.45	4.78	10.79	0.77
Other	16	24.35	6.23	13.10	0.94

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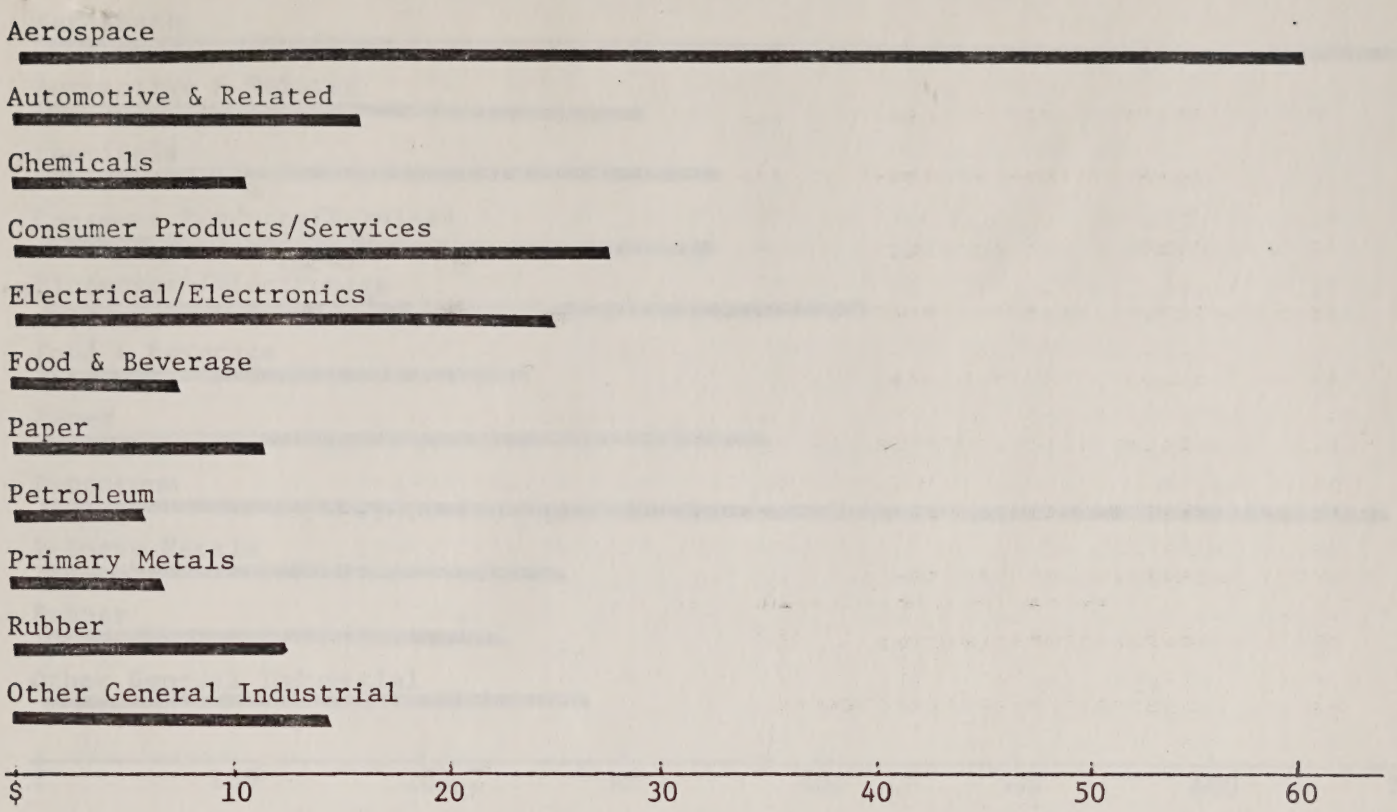
TABLE III COMPUTER VALUE/$1000 ASSETS WITHIN INDUSTRY GROUPS



Industry Group	Number of Companies	Value of Computers/$1000 Assets High	Low	Average	Ratio: Industry/ Average
Aerospace	10	$100.96	$ 30.56	$ 60.32	4.01
Automotive	6	16.34	10.94	15.60	1.04
Chemicals	11	24.56	3.95	11.01	0.73
Consumer	9	44.89	13.55	27.96	1.86
Elec./Elec.	16	77.63	7.79	24.55	1.63
Food & Bev.	3	11.22	6.20	8.49	0.56
Paper	3	17.31	7.18	12.35	0.82
Petroleum	15	19.86	3.47	6.74	0.45
Metals	6	9.75	7.02	8.24	0.55
Rubber	5	31.24	5.41	12.93	0.86
Other	16	32.32	5.02	14.80	0.99

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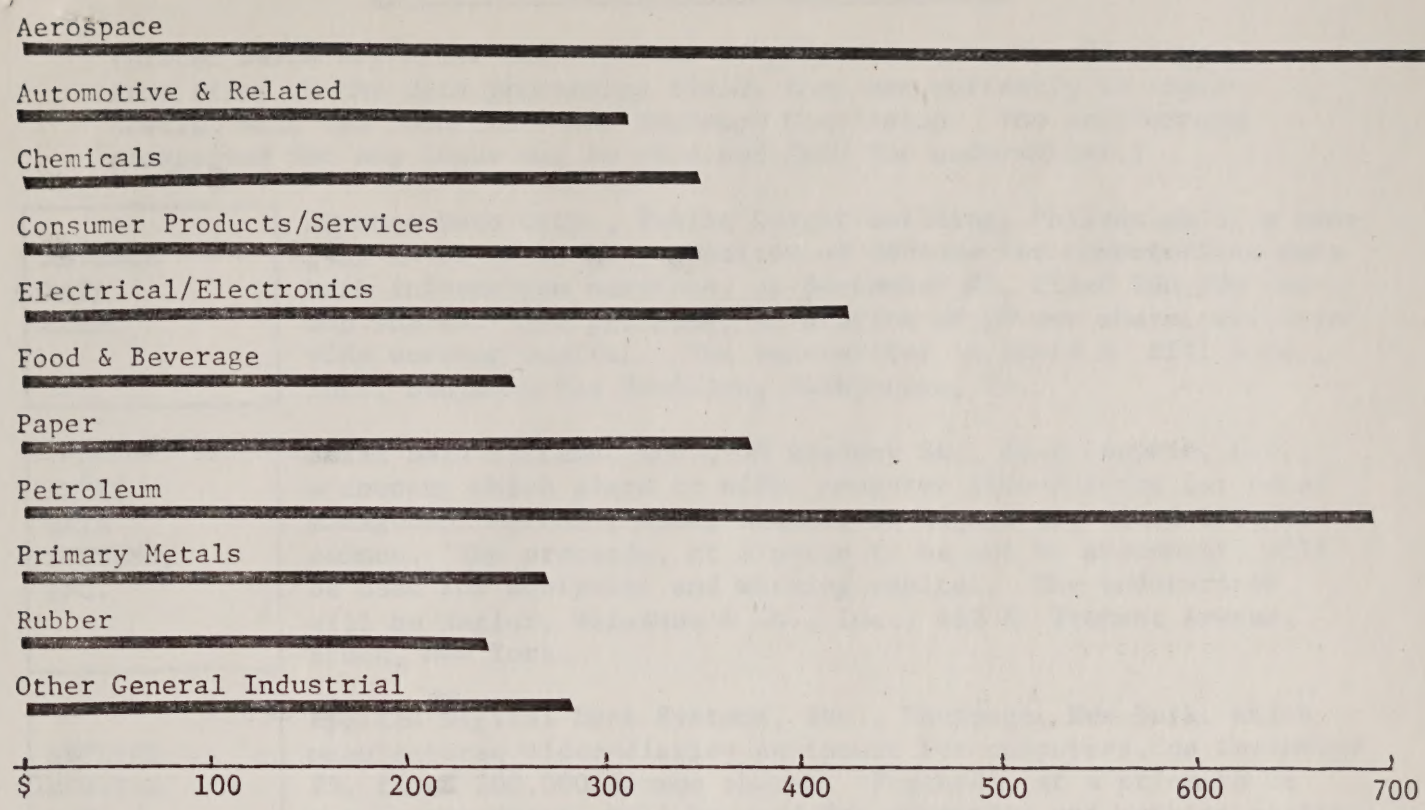
TABLE IV COMPUTER VALUE/EMPLOYEE WITHIN INDUSTRY GROUPS



Industry Group	Number of Companies	Value of Computers/Employee High	Low	Average	Ratio: Industry/ Average
Aerospace	10	$ 1,261	$ 373	$ 758	1.86
Automotive	6	383	254	311	0.76
Chemicals	11	490	166	346	0.85
Consumer	9	1,383	170	347	0.85
Elec./Elec.	16	979	144	409	1.00
Food & Bev.	3	317	199	253	0.62
Paper	3	537	227	374	0.92
Petroleum	15	2,153	385	695	1.71
Metals	6	424	227	270	0.66
Rubber	5	552	100	243	0.60
Other	16	622	138	289	0.71

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NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

ADVANCE DATA CORP.

Advance Data Corp., Public Ledger Building, Philadelphia, a company involved in the operation of offices for computerized data bank information services, on September 25, filed 262,500 common shares. The proceeds, at a price of $2 per share, will provide working capital. The underwriter is David B. Hill & Co., Inc., Benjamin Fox Pavilion, Jenkintown, Pa.

AMTEK DATA SYSTEMS, INC.

Amtek Data Systems, Inc., 53 Academy St., Poughkeepsie, N.Y., a company which plans to offer computer time-sharing for hotel management clients, among others, on August 25, filed 150,000 common. The proceeds, at a price to be set by amendment, will be used for equipment and working capital. The underwriter will be Nagler, Weissman & Co., Inc., 452 E. Tremont Avenue, Bronx, New York.

APPLIED DIGITAL DATA SYSTEMS, INC.

Applied Digital Data Systems, Inc., Hauppage, New York, which manufactures video-display equipment for computers, on September 29, filed 200,000 common shares. Proceeds, at a price to be set by amendment, will be used for expansion and working capital. The underwriter will be Durum Securities Corp., 609 5th Avenue, New York.

AUTO-GRAPHICS, INC.

Auto-Graphics, Inc., 751 Monterey Pass Road, Monterey Park, Cal., a company involved in image generation of text and graphics by means of a computer, on September 11, filed 210,000, of which 10,000 are offered by selling stockholders. Proceeds, at a price to be set by amendment (Max. $7.50 per share) will be used for expansion, debt repayment and working capital. The underwriter is Bateman Eichler, Hill Richards, Inc., 453 S. Spring, Los Angeles, California.

CALDWELL COMPUTER CORP.

Caldwell Computer Corp., 4300 N. Central Expressway, Dallas, a company which leases electronic data processing equipment, on September 15, filed $3,000,000 of convertible subordinated debentures and 20,000 outstanding common. The interest rate and the offering price (Max. $8) are to be supplied by amendment. Proceeds will be used for equipment, debt repayment, and working capital. The underwriter is Sanders & Co., Inc., Republic National Bank Bldg., Dallas, Texas.

CONTROLAMATION INC.

Controlamation, Inc., 157 Rome St., Farmingdale, New York, a company which plans to develop and manufacture devices designed to capture data on magnetic tape, on September 5, filed 99,000 common. Proceeds, at a price of $5 per share, will be used for equipment, working capital, and other corporate purposes. The underwriter is R.A. Wolk & Co., Inc., 405 Lexington Avenue, New York.

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September 8, - October 3, 1969

	1969 High	1969 Low	4 week Sales in 100's	4 week High	4 week Low	Last	4 week Net Change	4 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	82 3/4	59 1/2	4471	82 3/8	71	78 7/8	+ 5 1/4	+ 7.13
American R & D	70 3/4	44	4168	70 3/4	54 3/4	67 1/4	+10 1/2	+18.50
Ampex Corp.	47 1/2	32 1/2	4150	47 1/2	40	45 3/8	+ 4 1/2	+11.00
Bunker Ramo	17 5/8	9 1/2	4037	12 3/8	10 1/4	11 5/8	+ 1	+ 9.41
Burroughs	167 1/2	120 3/4	6016	167 1/2	143	158 1/2	+11 1/2	+ 7.82
Collins Radio	69 3/4	38 5/8	1518	52	40	46 1/2	+ 5 5/8	+13.76
Computer Sciences	30 7/8	19 1/2	7975	25 3/8	19 1/2	23	+ 2	+ 9.52
Control Data	159 1/4	125 1/8	11450	149 3/4	137 5/8	143 1/4	- 3 3/4	- 2.56
Electronic Assoc.	25 1/4	13 1/4	1389	18	15	16 1/4	+ 1 1/8	+ 7.31
General Electric	98 1/4	81	6652	86 7/8	81	86 1/8	+ 4 1/2	+ 5.51
Honeywell	145	107 3/4	3786	144	126	140	+ 9 1/2	+ 7.27
IBM	360 1/4	291 3/4	5547	360 1/4	331	344 3/4	+ 6 3/4	+ 1.99
ITT	58 1/2	46 1/4	9273	55 1/4	51 3/8	54 7/8	+ 2 7/8	+ 5.22
Leasco	54	22 1/2	9202	26 3/8	22 1/2	25 1/4	+ 1 1/4	+ 5.20
Litton	74 1/2	37 1/8	7344	48 1/4	42 3/4	45 5/8	+ 1/8	+ 0.27
Memorex	104	65	5318	100 1/4	85 5/8	97	+ 9	+10.22
National Cash Register	149 7/8	108	5016	149 7/8	132 7/8	141 5/8	+ 7 1/8	+ 5.29
Planning Research	38	23 7/8	1132	38	32 7/8	36 3/4	+ 3 1/2	+13.95
RCA	48 1/8	35 1/2	6834	43 1/8	37	42 1/8	+ 4 7/8	+10.13
Raytheon	50 1/4	30 5/8	3719	40 1/2	34 1/2	39 1/2	+ 3 3/4	+10.48
Sanders	61 7/8	22	5018	29 3/4	22	28 3/8	+ 4	+16.41
Sangamo	43 1/2	19 1/4	751	26 1/2	20 1/2	22 5/8	- 3 1/4	-12.57
SCM	47 1/8	28	1905	32 1/4	29	29 1/8	- 1 3/8	- 4.51
Singer	84 1/4	62	1598	73 3/4	65 1/2	73 3/4	+ 7 3/8	+11.11
Sperry Rand	55 1/2	38 3/8	7650	46 3/8	42	43 3/8	+ 1 1/4	+ 2.96
Teledyne	45 1/2	28 1/4	9129	39 3/8	31 1/8	38 3/8	+ 5 7/8	+18.10
University Computing	73 5/8	64 1/4	3611	71 3/8	64 1/4	66 1/4	- 1 1/8	- 3.11
Xerox	104	85 1/4	15467	104	90 1/2	97 1/2	+ 5 1/4	+ 5.69
NYSE COMPUTER STOCK AVERAGE							+ 3.86	+ 6.64
AMERICAN STOCK EXCHANGE								
Applied Data Research	32 7/8	19 1/2	437	24	19 1/2	19 3/4	- 4 1/4	-17.30
Automatic D P	89	63 1/4	323	89	80 1/2	87 1/2	+ 6 1/2	+ 8.02
Calcomp	37 1/2	18 1/4	1250	27 1/2	19 5/8	25 1/4	+ 1 1/4	+ 5.20
Clary Corp.	25 3/4	9 1/2	590	12 3/4	9 1/2	10 7/8	+ 3/4	+ 7.40
Computer Applications	21 7/8	9 1/2	288	11 7/8	10 1/8	10 1/8	- 1 5/8	-13.83
Computing and Software	59	37	1148	59	50 1/4	55 1/2	+ 4	+ 7.76
Data Proc. Fin. & Gen.	60 1/4	23 5/8	1896	35 7/8	25	32 7/8	+ 6 1/4	+23.47
Data Products	27 7/8	12 3/8	2729	15 3/4	13	15 3/8	+ 2 1/8	+16.03
Digital Equipment	85	54 1/2	3300	85	68 1/4	82 1/2	+12 5/8	+18.06
DPA, Inc.	12	8 1/8	1201	11 3/8	8 1/8	9 7/8	+ 1/4	+ 2.59
Granite Mgt.	45 1/2	16 3/4	1065	25 1/2	17 3/4	24 1/8	+ 4 3/4	+24.51
Greyhound Computer	28 5/8	12	352	14	12	12 7/8	- 1/8	- 0.97
ITEL	24 5/8	14 1/4	481	17 3/8	14 1/4	15	- 1/8	- 0.83
Levin-Townsend Comp.	57 1/2	23 3/4	1665	28 7/8	23 3/4	26	+ 1	+ 4.00
Milgo Elect.	34 1/2	17 7/8	2191	32 3/4	23	30 7/8	+ 6 7/8	+28.64
Mohawk Data Sciences	89 1/8	59 3/4	10919	89	69	73	-11 1/8	-13.23
Potter Instrument	38 7/8	23 3/4	3760	38 7/8	29 1/8	36 1/2	+ 3 1/4	+ 9.77
Randolph Computers	43 7/8	18	3619	39 3/8	33 1/2	38	+ 3 1/2	+10.14
Sys. Eng. Labs.	42 7/8	26 1/2	3629	42 7/8	33 7/8	40 3/4	+ 5 3/8	+15.19
Telex	66 1/4	20 3/4	7970	66 1/4	48 1/4	63 5/8	+13 1/4	+25.06
AMSE COMPUTER STOCK AVERAGE							+ 2.73	+ 7.98

	1969 High Bid	1969 Low Bid	Oct. 3, Bid	Oct. 3, Asked	4 weeks ago Bid	4 week net change Bid	4 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	19	6	7 5/8	8 1/8	7 1/2	+ 1/8	+ 1.66
Bolt, Beranek & Newman, Inc.	19	7 1/2	12 3/4	13 1/2	10 1/4	+ 2 1/2	+25.36
Computer Usage	40	7 3/4	11 1/4	12	8 3/4	+ 2 1/2	+27.11
Cyber-tronics	12 1/2	7	11 3/4	12 1/8	8 1/8	+ 3 5/8	+44.61
Digitronics	22 1/2	13 1/2	14 1/2	15 1/2	16	- 1 1/2	-11.25
Fabri-Tek	12 7/8	6 3/8	7 1/8	7 5/8	8 1/2	- 1 3/8	-16.18
Informatics, Inc.	30 1/4	14 7/8	14 7/8	15 3/8	17 1/2	- 2 5/8	-26.43
LMC Data, Inc.	8 1/4	3 1/8	3 1/2	4	3 1/2	--	--
Management Assistance	14 7/8	2 3/4	3 7/8	4 1/4	3 7/8	--	--
Optical Scanning Corp.	118	41	45	48	57	-12	-21.06
Recognition Equipment, Inc.	76	52	56 1/2	57 1/2	57 1/2	- 1	- 3.42
Tally Corp.	36	15	21	22 1/2	20	+ 1	+ 5.00
TBS Computer Centers Corp.	36	11	18 1/2	20	18	+ 1/2	+ 2.77

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" NOVEMBER 7,1969 • VOL.5,NO.3 P.J.McGOVERN,EDITOR

AFTER CONTROL DATA ANNOUNCEMENT, ALL MANUFACTURERS HAVE UNBUNDLING STANCE; MANY USERS ACQUIESCE TO IBM BUT SOME RECONSIDER PENDING ORDERS

Unbundling of computer pricing is the second milestone in the history of the computer industry, the first being the change from vacuum tube to transistor technology.

-- William C. Norris, President
Control Data Corporation

With the above dramatic -- if not unanimously accepted -- description of the importance of separate pricing, Control Data recently disclosed the details of its "price restructuring policy" formulated after IBM announced last summer that it was going to unbundle (EDP/IR July 14,1969). With this announcement, each of the major manufacturers had committed itself relative to IBM, and everyone concerned -- manufacturers, users, and industry observers alike -- was more or less standing back to see what would happen. For now, the majority feeling seems to be that the name of the game will change.

Most of the manufacturers have chosen to remain more or less "bundled," in some cases raising prices to take advantage of IBM's move. NCR has unbundled partially, providing a "basic package of supporting services." And Control Data, with its restructured policy quite similar to that announced by IBM, says that now "the sticker will be on the window glass."

This is an advantage to the customer, according to CDC's Norris. For one thing, he says, the customer for the first time will know the dollar value of exactly what he is buying and therefore can be more discerning with respect to whether or not he actually wants some of the items proposed. Most important, he continues, services heretofore included in the price of the hardware must improve in quality simply because when a customer pays for something he is going to be more demanding of its quality.

The extent of such demands is varied, of course, and the overall reactions from users are not nearly clear. Most IBM customers, despite possible gripes, will acquiesce to the new pattern laid out by the industry giant. There are two groups of its customers, however, that can exhibit a certain amount of resistance to IBM if they desire. The first is the large user, who already supplies much of his own software and systems engineering backup. He may do little or nothing different for the time being. The second is the customer with IBM equipment on order. He is in the position to express his attitude strongest in economic terms, and in many cases he is taking action. Later in this issue we will present the reactions from a cross-section of users in this latter category.

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What manufacturers are doing

As we pointed out above, some major manufacturers have adopted a policy of complete or partial unbundling; others have raised prices; still others have kept a virtual status quo. Here is a rundown on the pricing policies from the major mainframe manufacturers, with discussion where appropriate:

IBM -- The whole thing started with IBM, of course, and the details of its pricing changes have been spelled out in great detail both here (EDP/IR July 14, 1969) and elsewhere. Essentially, lease and purchase prices have been reduced by 3%, all systems engineering services and most field engineering services will be billed at an hourly rate ranging up to $35, almost all new software will be called a "program product" and charged to customers under a license agreement, education will be billed to the customer, and a new type of "custom contract service" will virtually put IBM into facilities management.

Despite the reduction in hardware prices, the effect of this new policy is a price increase. The amount of the increase is debatable, but within a year or so it will push up charges to a level from 20% to 30% above the bundled price. Because of these increases, unbundling may cost IBM a small portion of its market share . . . probably some of its least profitable customers. In any event, there is virtually no question but that unbundling will increase IBM's profits.

Control Data -- The unbundling details from CDC, as mentioned above, closely parallel those from IBM; in one sense, they go even further in that maintenance has also been removed from the lease price of a system. In addition, CDC has upped its hardware prices by 4% to 6%. The four types of support services that CDC will price separately are as follows:

- All software released after Jan. 1, 1970 will be made available under license for unlimited use on a single central processor; it will not be sold. Each of these products will carry a one-time installation charge and a monthly license fee; the one-time charge, typically, is two to five times that of the monthly fee. A software product may be used on an additional mainframe in "the same general site" at the additional cost of 20% of the basic monthly royalty and 50% of the basic installation charge. When a system is first delivered, there will be no installation charge for one operating system, one business compiler, and one scientific compiler; monthly royalties, however, will be charged for these products.

- After Jan. 1, 1970, professional analyst services -- such as systems analysis and design, applications design and development, conversion and implementation planning, installation evaluation and improvement, major systems modifications, and installation of special utility software -- will be priced separately. Rates for these services will vary from $22 to $35 per hour depending upon the service classification required to accomplish a defined task.

- Effective Jan. 1, 1970, data processing education and training courses will be provided by Control Data Education Institutes at prices "consistent with the complexity and duration of course offerings." Typical prices run from $150 to $250 per student, with prices going as high as $500 to $1000 for complex operating systems. The Institutes will be the focal point of what are to be called Control Data Centers of Learning.

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- The lease customer will now be able to contract separately for maintenance under a plan similar to that always available to the customer who had purchased his system. Now, CDC will offer two maintenance plans to hardware customers: 1) Total maintenance coverage exactly as offered in the past. 2) Customer performing his own maintenance, with CDC supplying spare parts, tools and test equipment, documentation, and diagnostic programs. A complete curriculum for training customer personnel to perform maintenance will be offered by the Centers of Learning.

National Cash Register -- "NCR believes each user of its computer systems must be provided with a certain essential amount of systems support and educational assistance," says R. Stanley Laing, president. "This basic package of supporting services must be the responsibility of the equipment manufacturer." Additional services will be priced separately. NCR has decided to base the amount of free service on the amount of rental a customer pays; for each $1000 of monthly rental, 30 man-days of systems support will be provided.

Under this formula, the company says, the user of a basic Century 100 will be entitled to approximately 60 man-days of systems support. This is a one-shot offer, designed to get a new user up and running, and the time is provided by an experienced systems analyst. Once the time is used up, the customer will be billed at the announced new rates: $20/hour for the Century 100; $22/hour for the Century 200; and $25/hour for an on-line system. Also, beginning on Jan. 1, 1970, the same pricing concept will be applied to the areas of educational support and software including both applied programs and computer languages.

Burroughs -- Probably the first manufacturer to talk publicly about unbundling, Burroughs has announced such a program only for its TC-500 and for selected bookkeeping equipment. Under this program, the customer can sign a new five-year contract that keeps things bundled the way they were in the past, or elect a price separation plan. Under this plan, prices for hardware will be lowered and customers will be able to chose from four methods of identifying costs for application software:

1 -- Customized programming can be written by a Burroughs applicational software representative according to the customer's specific requirements.
2 -- The customer can select standard applicational programs supplied by Burroughs.
3 -- The customer can select a standard program and have it modified for his application.
4 -- The customer can do his own programming after receiving training from Burroughs.

No word has come out from Burroughs as to what its policy will be regarding its larger computer systems. President Ray W. Macdonald has said that the same choice as outlined above will be extended to large EDP system users and that pricing will be announced shortly.

Honeywell chose to "maintain its package pricing policy for data processing computer systems," rather than follow IBM's strategy. In making the announcement shortly after IBM disclosed its unbundling plans, Honeywell spokesmen stated that the decision was based on results of a six-month study. In the same announcement, Honeywell said that rental prices are being raised about one per cent.

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This price increase in essence reflects increased maintenance costs, as indicated by this statement in the press release: "Adjustments also will be made in maintenance rates for purchased systems." This seven percent increase reflects the true nature of the rental increase.

Few Honeywell customers, however, will be affected by these price increases. Some 70% of the company's systems are leased under three- or five-year contracts, and these won't be affected until present agreements expire. And long-term contracts -- discounted from three per cent to 11 per cent over normal one-year contracts -- will continue to be available. So for the bulk of its present and future customers, Honeywell hasn't changed the status quo.

The adoption of this posture, company spokesmen say, has already been beneficial. Salesmen already indicate that they are booking some orders that probably would have gone to IBM before unbundling. And they have even better prospects for next year . . . after computer users start feeling the financial drain that unbundling may cause.

General Electric -- A general price increase is GE's answer to unbundling. Rental rates on the GE-400 and GE-600 lines are being increased by 5.1% and purchase prices by 3%. Rental rates on the GE-200 go up 1%. Maintenance prices for purchased equipment will be increased 5% on the GE-200, 400, and 600 lines. The GE-50 and GE-100 lines are essentially not affected.

RCA -- With no plans to unbundle or raise prices, RCA says it is "seriously considering, and the probabilities are that RCA will offer an unbundled option" for some of its services.

Univac -- Again, there is no change. Univac says that the various pricing announcements "do not justify any modification of our established practice of 'packaged pricing' for systems and services. In addition, those products and related services which have previously been priced separately will continue to be offered to qualified users on the same basis as they have been in the past."

SURVEY SHOWS ABOUT ONE-THIRD OF IBM'S ORDERS BEING RECONSIDERED

To help assess the customer's attitude toward unbundling, EDP/IR recently conducted a specialized survey . . . one designed not so much to establish the absolute situation as to indicate the mood of a certain group. From the extensive files of the International Data Corporation, our publisher, we selected the names of 50 installation managers who had IBM System/360 equipment on order at the time of the unbundling announcement. The type of installation ranged from one ordering its first computer to some with a hierarchy of computers headed by a 360/65. The manager of each was interviewed on the telephone.

The basic question we discussed with each of the installation managers was: "In the light of unbundling, have you reconsidered your outstanding order for new IBM equipment?" Of the 50 people interviewed, 34 stated they were not reconsidering their order. Why?

About one-third of these simply listed IBM's service and dependability as the reason; about another third reported they supplied their own systems and software support already, so might actually save money under unbundling, at least for a few years; a slightly smaller group said they were "locked in" to IBM and couldn't change vendors if they wanted to.

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Many of these reasons sound very familiar. But it is the reasons given by the other 16 managers that were of primary interest to EDP/IR. Members of this group were willing to reconsider their IBM order, and a few will actually cancel. In any event, the comments are of interest:

- [Retail food distributor with 360/40 on order to replace 360/30]- As soon as we learned about unbundling, we added 25% to our budget. We won't shut our eyes to anything reasonable. Of course, we rent computers and if the cost of the 360/40 runs too high, we'll just move it out after a few months and get something else.

- [Wholesale distributor using 360/20 and H-200]- We have IBM equipment (a 360/25) on order to protect our position, but since we are using both IBM and Honeywell, and since we don't need to replace any existing equipment until early 1971, we really expect to wait and see. We will be particularly watching to see how software systems, schools, and promised equipment performance work out.

- [Hospital considering 360/25 as first computer]- We didn't actually have a computer on order, but were strongly considering the IBM system. All of a sudden, unbundling was announced and a competitor (Honeywell) came in out of the blue with a better proposal . . . one that included software support. During this period, the IBM salesmen didn't impress us nearly so much. The final decision will be made shortly.

- [Branch of large manufacturing company planning to upgrade 360/30 with 360/40]- We have definitely decided against accepting the IBM equipment we have on order. The choice is between equipment made by two other manufacturers and the decision will be made promptly.

- [Branch of large manufacturing company planning to switch from an IBM 1130 to a 360/25 or something]- We have developed almost all our own software with the 1130, so aren't hooked. A competitor to IBM (NCR) is offering almost a 40% savings over our projected cost for the 360/25, so we will probably go with them.

- [Small manufacturing company with 360/20 on order as first computer]- We haven't made a decision yet, but are backing off a little from IBM. The start-up costs seem too high, so we are looking around. We are certain the 3% (from IBM) discount won't be enough for us and we are afraid of the potential costs.

- [Medium-sized manufacturer planning to upgrade from IBM 1401 to a 360/25]- Unbundling offers a horrible, horrible unknown cost factor to the small user, and we can't afford this. We certainly can't afford to hire systems people at IBM's prices. We are switching to a Univac 9300 disk system where the price is more attractive and the software is included.

- [Large user with 360/65 and several other systems, and a 360/20 on order]- We are not concerned with education or software support, since most of this work is done in-house anyway. But unbundling means we will take a hard look at the whole problem as soon as all the figures are presented in black and white.

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In addition to such users, who are reconsidering their orders with IBM, there also were those who pointed out the possible advantage of third-party leasing now that unbundling is upon us:

- [Large manufacturer planning to upgrade 360/30 to 360/40] - In our operations we are 100% PL/1 (and like it) so we must stay with IBM. However, since a third-party leasing company has promised us a 15% discount with a three-year lease, or a 10% discount with a one-year one -- both including first-shift maintenance -- we will probably switch the order over to a leasing company at the last minute.

- [Branch office of large company upgrading from 1401 to 360/25]- We lease from a third party now, so we will probably do the same thing on the new system. Our central office provides all systems engineering and software support, so we are really independent.

- [A large banking user with a hierarchy of systems]- We have two 360/50s on order, and we still plan to install them. But we are considering the placing of them on third-party lease, and are investigating other means of savings. We have not conducted a major study of unbundling, but we have dealt with software houses for some time and already have a software budget.

IRS ISSUES SOFTWARE GUIDELINE; LITTLE CHANGE REQUIRED

After all the speculation and rationalization about how the Internal Revenue Service would rule on the capitalization of software (EDP/IR July 30,1969), the official position has now been stated and, with one exception, it seems to be a confirmation of the status quo. The guideline is published as IRS Revenue Procedure 69-21, issued October 8.

Capitalization is required, according to Section 4 of the Procedure, in cases where a customer purchases packaged software from the outside. In such situations, the user is directed to amortize his costs over a period of five years, or less if he can show that the package has a shorter life. In these cases the customer will find himself paying some taxes sooner and during a portion of the five-year period losing the use of capital.

In general, however, IRS has decided that the development of software so closely resembles certain research and experimental expenditures that it can be given similar treatment. The user can elect to treat software development either as an operating cost or as an intangible asset, for tax purposes. All the guideline gets slightly fussy about is, once a method of accounting is elected, it must be followed . . . and can be changed only for a valid business reason

The guideline takes care of two questionable situations before they could become problems. One of these forestalled questions has to do with bundled software. IRS suggests that it will accept software as part of the hardware so long as it is not priced separately in the contract or invoice. Thus, users who buy computers with bundled software (see story, page 1) will be able to continue depreciating software on the accelerated time schedule used for hardware in their tax accounting. And if the investment tax credit returns, it even better.

Also, the new guideline assures software developers that they may capitalize their expenses. Thus, firms operating in the red will find this a way of

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spreading offsets to income over a longer period than would be possible by simply carrying forward losses beefed up by programming costs treated as operating expenses. Such firms, however, should give careful thought to the decision to handle software as an intangible asset, lest it become a burden in better times.

And for the user who would like to vary his software expenditures between expensed payments and amortizable outlay, there seems to be a solution. Many software suppliers charge a one-time installation fee in addition to regular monthly license fees. And this installation fee seems to fall into the amortizable category. Thus, with a little negotiation, it appears that the ratio between installation fee and monthly license fee could be varied to satisfy the requirements of a given user.

NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

CONVERSATIONAL COMPUTING, INC.	Conversational Computing, Inc., 10465 Melody Drive, Denver, Colorado, which plans to establish and operate a computer programming school, on September 2, filed 300,000 common. The proceeds, at a price to be set by amendment (Max. $1 per share) will be used for general corporate purposes. The underwriter will be Kureen & Cooper, Inc., 26 Broadway, New York, New York
DIALOG COMPUTING, INC.	Dialog Computing, Inc., 1305 Post Road, Fairfield, Conn., a company which provides computer time sharing services, on September 12, filed 400,000 common. The proceeds, at a price to be set by amendment (Max. $15) will furnish working capital. The underwriter is Dabbs Sullivan, Trulock & Co., Inc., 412 Louisiana, Little Rock, Arkansas.
INFORMATION COMPANY OF AMERICA	Information Company of America, 225 S. 15th St., Philadelphia, which provides services in information storage, processing, and retrieval, on September 18, filed 125,000 shares of common. The proceeds, at a price of $7 per share, will be used for expansion, working capital, and other corporate purposes. The underwriter is Seidiltz & Co., Inc., 305 Park Ave., New York, N.Y.
NATIONAL SOFTWARE EXCHANGE, INC.	National Software Exchange, Inc., Station Plaza East, Great Neck, N.Y., a company involved in the marketing of computer systems and other related activities, on September 25, filed 90,000 common shares. Proceeds, at a price of $50 per share, will furnish working capital and be used for other corporate activities. The underwriter is Investors Centers, Inc., Hillside Avenue, Jamaica, New York.
OPTIMUM COMPUTER SYSTEMS, INC.	Optimum Computer Systems, Inc., 120 W. 31st St., New York, a company which provides a variety of computer services, on August 29, filed 100,000 common shares. Proceeds, at a price to be set by amendment, will be used for debt repayment, expansion, and working capital. The underwriter will be Orvis Brothers & Co., 30 Broad St., New York, N.Y.

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October 7 - October 17, 1969

NEW YORK STOCK EXCHANGE	1969 High	1969 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
Addressograph-Multigraph	85	59 1/2	4093	85	76	77	- 1 7/8	- 2.38
American R & D	72 1/4	44	1957	72 1/4	63	72 1/4	+ 5	+ 7.43
Ampex Corp.	48	32 1/2	1754	48	42 3/4	47 1/2	+ 2 1/8	+ 4.68
Bunker Ramo	17 5/8	9 1/2	5180	14 1/2	11 7/8	14 1/8	+ 2 1/2	+21.51
Burroughs	167 1/2	120 3/4	2626	163 3/8	152	153 7/8	- 4 5/8	- 2.92
Collins Radio	69 3/4	38 5/8	356	52 7/8	44 3/4	50 1/2	+ 4	+ 8.60
Computer Sciences	30 7/8	19 1/2	5555	24 7/8	21 1/8	23 7/8	+ 7/8	+ 3.80
Control Data	159 1/4	125 1/8	3528	151 3/4	142	146 1/2	+ 3 1/4	+ 2.27
Electronic Assoc.	25 1/4	13 1/4	1430	20 3/4	16 1/2	19 1/8	+ 2 5/8	+16.15
General Electric	98 1/4	81	3139	87 3/8	83 1/2	86 1/2	+ 3/8	+ 0.44
Honeywell	149 3/4	107 3/4	1550	149 3/4	134 1/8	148 1/2	+ 8 1/2	+ 6.07
IBM	360 1/4	291 3/4	2782	356	340 1/4	351	+ 6 1/4	+ 1.81
ITT	60 1/8	46 1/4	5425	60 1/8	54 1/2	59 3/8	+ 4 1/2	+ 8.20
Leasco	54	22 1/2	4090	31 1/4	25 3/4	29 1/2	+ 4 1/4	+16.83
Litton	74 1/2	37 1/8	7007	56 3/8	43 7/8	54 1/8	+ 8 1/2	+18.63
Memorex	124	65	5718	124	96 1/2	121 1/4	+24 1/4	+25.00
National Cash Register	150 1/2	108	1857	150 1/2	141 3/4	142 1/2	+ 7/8	+ 0.62
Planning Research	39 3/4	23 7/8	486	39 3/4	36 1/8	39 3/4	+ 3	+ 8.16
RCA	48 1/8	35 1/2	3235	44 3/4	41 5/8	44 1/8	+ 2	+ 4.75
Raytheon	50 1/4	30 5/8	1395	42	38 3/4	41 1/4	+ 1 3/4	+ 4.43
SCM	47 1/8	28	2607	32 3/8	28 3/4	29 1/2	+ 3/8	+ 1.29
Sanders	61 7/8	22	4438	36	28 1/4	33 3/4	+ 5 3/8	+18.94
Sangamo	43 1/2	19 1/4	422	24 7/8	20 7/8	23 3/4	+ 1 1/8	+ 4.97
Singer	84 1/4	62	991	75 1/2	72 1/8	74 1/2	+ 3/4	+ 1.02
Sperry Rand	55 1/2	38 3/8	5565	45 3/8	41 7/8	44	+ 5/8	+ 1.44
Teledyne	45 1/2	28 1/4	4683	42 1/8	36 7/8	40 3/4	+ 2 3/8	+ 6.19
University Computing	88 3/8	64 1/4	3830	88 3/8	66 1/4	84 7/8	+18 5/8	+28.11
Xerox	109 7/8	85 1/4	7631	109 7/8	96 1/2	108 1/2	+11	+11.28
NYSE COMPUTER STOCK AVERAGE							+ 4.23	+ 8.12
AMERICAN STOCK EXCHANGE								
Applied Data Research	32 7/8	19	209	20 1/2	19	20 1/2	+ 3/4	+ 3.80
Automatic DP	95 1/2	63 1/4	471	95 1/2	87 1/8	95 1/2	+ 8	+ 9.14
Calcomp	37 1/2	18 1/4	1108	28 1/2	23 1/2	26 1/4	+ 1	+ 3.96
Clary Corp.	25 3/4	9 1/2	378	12 7/8	10	12 1/8	+ 1 1/4	+11.49
Computer Applications	21 7/8	9 1/2	263	11 5/8	9 1/2	11	+ 7/8	+ 8.64
Computing and Software	59	37	917	55 1/4	48 5/8	53 3/8	- 2 1/8	- 3.83
Data Proc. Fin. & Gen.	60 1/4	23 5/8	1046	37	31 7/8	35 3/4	+ 2 7/8	+ 8.75
Data Products	27 7/8	12 3/8	3316	17 1/2	14 3/8	17	+ 1 5/8	+10.57
Digital Equipment	87	54 1/2	1905	87	78	85	+ 2 1/2	+ 3.03
DPA, Inc.	12	8 1/8	505	10 7/8	9	10 1/4	+ 3/8	+ 3.80
Granite Mgt.	45 1/2	16 3/4	490	25 3/4	22 3/4	25 1/2	+ 1 3/8	+ 5.70
Greyhound Computer	28 5/8	12	350	14 3/8	12	14	+ 1 1/8	+ 8.74
ITEL	24 5/8	14 1/4	270	17	14 1/2	17	+ 2	+13.33
Levin-Townsend Comp.	57 1/2	23 1/2	1805	28 3/8	23 1/2	28 1/4	+ 2 1/4	+ 8.65
Milgo Elect.	41 1/4	17 7/8	2318	41 1/4	31	39 5/8	+ 8 3/4	+28.34
Mohawk Data Sciences	89 1/8	59 3/4	1441	76 1/4	70 1/2	74 5/8	+ 1 5/8	+ 2.23
Potter Instrument	43 3/8	23 3/4	3473	43 3/8	36	41 3/8	+ 4 7/8	+13.36
Randolph Computers	43 7/8	18	1850	42 3/4	38 1/8	42	+ 4	+10.53
Sys. Eng. Labs.	48	26 1/8	3825	48	40 3/4	45 3/4	+ 5	+12.27
Telex	77	20 3/4	5131	77	61 3/4	76 1/4	+12 5/8	+19.84
AMSE COMPUTER STOCK AVERAGE							+ 3.04	+ 9.12

OVER-THE-COUNTER	1969 High Bid	1969 Low Bid	October 17, Bid	October 17, Asked	2 weeks ago Bid	2 week net change Bid	2 week % change Bid
Aries Corp.	19	6	8 1/8	8 1/2	7 5/8	+ 1/2	+ 6.56
Bolt, Beranek & Newman, Inc.	19	7 1/2	15	15 3/4	12 3/4	+ 2 1/4	+17.65
Computer Usage	40	7 3/4	12	12 3/4	11 1/4	+ 3/4	+ 6.67
Cyber-tronics	13 7/8	7	13 1/2	14	11 3/4	+ 1 3/4	+14.89
Digitronics	22 1/2	13 1/2	18 1/2	19 1/2	14 1/2	+ 4	+27.59
Fabri-Tek	12 7/8	6 3/8	8	8 1/2	7 1/8	+ 7/8	+12.28
Informatics, Inc.	30 1/4	11 3/4	16 3/4	17 1/2	14 7/8	+ 1 7/8	+12.61
LMC Data, Inc.	8 1/4	3 1/8	3 1/4	3 3/4	3 1/2	- 1/4	- 7.14
Management Assistance	14 7/8	2 3/4	4 7/8	5 1/4	3 7/8	+ 1	+25.81
Optical Scanning Corp.	118	41	43	46	45	- 2	- 4.44
Recognition Equipment, Inc.	76	52	66 3/4	67 3/4	56 1/2	+10 1/4	+18.14
Tally Corp.	36	15	26 1/2	28	21	+ 5 1/2	+26.19
TBS Computer Centers Corp.	36	11	21	22	18 1/2	+ 2 1/2	+13.51

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IBM, UNDER FIRE FROM USERS, REVISES SYSTEMS ENGINEERING AGREEMENT; MAKES GAINS THROUGH PRE-TRIAL RULING ON ANTITRUST SUITS

The first contract was written by lawyers . . . the second one by the marketing people.

That's the way a person close to the action summed up the turmoil that resulted in IBM's making substantial changes to its Agreement for IBM Systems Engineering Services. Large IBM users across the country, led by financial institutions and other sophisticated customers, objected so strongly to the initial wording of the agreement governing the use of IBM's contract services that IBM not only listened to customers' gripes, but reacted to them.

And in the meantime, IBM won a point at the St. Paul pre-trial hearings on the four major private antitrust suits it faces. Its motion was upheld to strike from the complaints any references to the 1956 Consent Decree and the 1935 injunction restraining its activities in the computer and tab equipment markets.

"Rights in Data" caused trouble

The point that stirred up customer complaints against IBM's Systems Engineering Agreement dealt with "Rights in Data." It looked as if IBM SE's could carry off programs and ideas they had prepared under contract to the customer, for IBM to use as it saw fit. Firms which had poured a lot of effort into software, hoping to market proprietary products, were afraid these materials would be used by IBM as the basis for competing software products. With the revision, a majority of customers were sufficiently placated and they signed . . . some begrudgingly, with a scattering of die-hards still holding out for further changes.

So now IBM has "coated the pill." Even the limited changes it made indicate that users can -- when acting together -- set some of their own terms in dealing with the dominant computer company. While many users decided on their own not to sign, the effectiveness of coincidental or planned agreement among IBM customers seems, in part, to trace back to a movement started by a large Boston bank.

Users are not, however, becoming overconfident about their new sense of power. A majority don't expect any more concessions. Many who signed the revision despite various reservations seemed to be operating under the principle: "Don't stretch your luck." But actions speak louder than signatures, so IBM will notice some missing business as users turn more to their own systems people and/or look toward independent software houses.

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—actions to the revised version are divided

While a few firms surveyed by EDP/IR saw nothing amiss with the original agreement, most had objected to it on the advice of their legal staffs. The discontent emerged at the August and September meetings of two IBM users' group -- Share, heavily loaded with large firms, and Guide. Each hashed out a list of complaints about unbundling. While the new SE agreement is said to have satisfied the relevant objections included in those lists, opinion among firms recently interviewed has been divided.

Some are relatively happy with the revision, but others have doubts about the treatment of confidential information, rights to joint discoveries, transfer of IBM personnel and limitation of liability. One user refused to sign what he called an "overreaching" agreement and was, when last queried, still negotiating with IBM . . . but with the feeling that IBM might just shrug its shoulders and do without that firm's business.

Also, many large users feel they are self-sufficient enough to be relatively unaffected by either unbundling or the Systems Engineering Agreement.

Changes in the Agreement -- "Rights in Data"

A New England bank says it "led the parade" against signing the original contract and reports that thru a snowballing process word spread in the banking industry that nobody was going to accept the IBM document. Within a couple of weeks, a revision was distributed to upset users; it included prominent changes in the disputed Rights in Data section.

According to the first version, any original material prepared for the customer by IBM under the agreement belonged to the customer, but IBM got an "irrevocable, non-exclusive, unrestricted, world-wide and royalty free license . . . with respect to all such material . . . " Hence the "what's yours is ours" description of the agreement. But according to the revision, this written material belongs to the customer . . . period.

While IBM claims no rights to written material describing programs, it is less generous with intangible ideas and techniques related to data processing. The revision states that "ideas, concepts, know-how, or techniques related to data processing" are, when discovered or developed by customer personnel, the property of the customer; nothing is said about compulsory licensing. But joint discoveries which include data processing ideas continue to be available to both the customer and IBM.

Confidential information

The complaint made about both versions of the Systems Engineering Agreement is that confidential information is not adequately protected, and because of the limitation of liability written into the agreement, the user has little legal recourse.

The original assurance with respect to such information reads: "IBM will instruct its personnel to use the same care and discretion that they use with similar information which IBM designates as confidential." Now it says: "IBM will instruct its personnel to keep such information confidential by using the same care and discretion . . ." etc. [Emphasis ours.] For technical data,

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the customer is instructed to list his secrets on a separate "Confidentiality Supplement."

Personnel transfer

Another source of irritation was the untactfully brief statement that "IBM shall have the sole right to determine the assignment of its employees in the performance of this Agreement." In the revision, IBM has added the soothing words: "IBM will make every effort consistent with sound business practices to honor the specific requests of the Customer with regard to the assignment of its employees . . ."

Liability provision unchanged -- stirred up users gain little by becoming suers

The "Limitation of Liability" section lies untouched. One customer commented that now that liability is held down to the cost of developing software, there is no longer much to be gained by suing if IBM makes an error or discloses confidential information.

Another unchanged section concerns "Service Estimates." One user now debating whether to accept the revised version questioned, among other things, IBM's unwillingness to do a systems engineering job for a guaranteed fixed price. He doesn't see how IBM can hold to that and still compete with independents willing to quote fixed prices.

The long view

The curious thing about all this outcry is that, at first glance, IBM is merely guaranteeing itself the right to do what it has always done. It is the finality of the printed word -- coupled with the prudent clause limiting IBM's liability to the estimated cost to develop the software -- that has stirred up the hornets' nest. This limitation is not surprising in view of recent suits against companies failing to deliver software of promised quality.

But IBM customers are now quick to question the terms on which they get systems help . . . not only because these are now written into a legal document, but also because, with unbundling, users have the ability to reject a part of the hardware/software offering without cutting loose from IBM entirely.

For the independent software companies, the SE agreement should be frosting on the unbundled cake, since those provisions unattractive to many customers are shooing computer users out of the Gray Giant's arms into theirs. A number of management executives from users we contacted praised unbundling's purely psychological effect of forcing data processing managers to think twice about the quality of their software.

The lesson from this round between IBM and its customers is that IBM cannot unilaterally set the rules for the unbundled market. Big users are becoming experienced enough to look elsewhere for software and/or hardware, although small and medium-size customers remain cautious. As we pointed out in a recent survey of customers with IBM machines on order (EDP/IR, Nov. 7, 1969), many installations are considering switching orders to other manufacturers. Now further inquiry shows that a number of big users will be impelled by the "one-sided" provisions of the SE agreement to go to independents for their systems work as well as do more in-house.

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User's reactions

We talked to large IBM financial and industrial customers in various parts of the country about the Systems Engineering Agreement. Their comments, paraphrased here, showed attitudes ranging from near-indifference to vivid concern.

- [Large financial user] -- Our objections have been pretty well met by the revised version, although we anticipate that IBM will have an interesting time with the confidentiality provision. IBM has coated the pill.

- [A New York State manufacturer] -- Our lawyers call this an overreaching agreement, and we won't sign until IBM does something about the provisions dealing with confidentiality, rights in data, and limitation of liability. But we have the feeling IBM will just shrug its shoulders and do without our business. We haven't talked to other users about this decision -- it was reached independently.

- [Large manufacturer of household and industrial products] -- We are still negotiating for changes in the "Rights in Data" section of the revised agreement. We hope that, if other users are holding the line, IBM will have to make some more changes despite its apparent tough attitude. Even if we ultimately sign this version, we and other large users will be "antiseptic" in our use of IBM systems engineers and will keep them out of projects where valuable techniques are involved.

- [A Southern textile firm ranking among the EDP 100 users] -- We have signed a revised SE agreement for some of our locations. Our legal staff hasn't looked into it and we find nothing wrong with the agreement.

- [A non-metropolitan user ranking among the EDP 100] -- Our biggest objection is that IBM will not guarantee performance, and the limitation of liability leaves us little recourse. Also, rights to jointly developed techniques are not clear. (IBM should have some interesting wrangles with software houses about who invented what.) We will probably end up signing, however, since our in-house capacity is limited and there isn't much local talent.

- [Southern California aerospace firm] -- We have been doing most of our own SE work, except when IBM has had a particularly good man to offer, so whether we sign or not, this agreement is of no great concern to us. The prospect of IBM people carrying off valuable ideas doesn't present an unusual problem, since turnover in this industry is so great that our own employees may do the same. We will rely more on our own people in the future though, because we have no control over whom IBM sends or when he is transferred.

- [A Midwest appliance manufacturer] -- We recently signed the revised version. We are fairly satisfied now that the disclosure provision has been changed. Of course, we don't like the high price for Systems Engineers and we will try to develop more in-house expertise.

- [A New Jersey manufacturer who was interviewed before he had received the revised version] -- We don't like this agreement and may propose our own . . . to IBM's calf-eyed salesmen who can't believe we would insult Big Mother this way. To our knowledge, other major New York area firms are also balking at signing [the unrevised version].

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MINNESOTA COURT MAKES PRE-TRIAL RULINGS ON ANTITRUST CASES

The U. S. District Court at St. Paul has ruled on several motions made by IBM in pre-trial hearings concerning the four antitrust suits that have been consolidated for pre-trial purposes in the Minnesota court. The fifth suit is being presented separately in New York by the Justice Department (EDP/IR,Jan.28, 1969). The ruling represents both gains and losses for IBM in its private suits.

Starting almost a year ago, antitrust suits were brought against IBM by Control Data (EDP/IR,Dec.23,1968), Data Processing Financial and General (EDP/IR, Jan.9,1969), Applied Data Research (EDP/IR,Apr.24,1969) and Programmatics, acquired by ADR last August.

The opinion orders that:

- References to the 1956 Consent Decree and the 1935 injunction involving IBM must be stricken from the complaints, and evidence of these decrees won't be allowed at the trial. But the judge invited immediate appeal of this decision.

- The charges by ADR that IBM has misled the public concerning the nature of software and has perpetrated a fraud on the patent office may remain in the complaint.

- IBM is denied its request for "preferential discovery," i.e., it does not get to go first in a full round of questioning aimed at uncovering relevant evidence before the trial.

$4 billion removed from claims

Dropping claims based on the Consent Decree removed over $4 billion from the DPF&G and ADR complaints. But the amount still explicitly requested in just those two complaints is still around $3 billion, and Control Data has asked for triple an unspecified level of damages to compensate for direct losses and foregone profits resulting from what CDC claims are illegal IBM activities. In addition, DPF&G and ADR will demand an unknown sum representing losses incurred after the complaints were filed -- which could add up to a healthy figure if the suits take, say, four years to be concluded. (That's how long it took IBM and the Justice Department to arrive at the 1956 Consent Decree.)

So even with these substantial claims removed, potential direct dollar costs to IBM are still high enough to affect its very position as a competitor in the data processing industry. To put these figures into perspective . . . the amount of after-tax profits IBM will take in during 1969 is probably close to a billion dollars. Or, for another example, the estimated value of computers shipped in the first half of this year by IBM was about $3 billion. (EDP/IR, Sept.11,1969).

Furthermore, the ruling may not stick. Judge Philip Neville, who wrote the opinion, has in effect invited the litigants to immediately appeal this part of the decision, because the ruling involves a " . . . controlling question of law as to which there is substantial ground for difference of opinion." Usual procedure is to hold off from making any appeals until the case has gone to trial and been decided. The plaintiffs have taken advantage of this opening to ask the Eighth Circuit Court of Appeals in St. Louis to hear an appeal, and

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IBM is also in favor of getting the issue decided before trial.

A separate appeal has been filed by DPF&G based on what the court called an "ingenious and novel theory" that the leasing firm is a third-party beneficiary of the 1956 Consent Decree and may ask for single damages for breach of contract, if IBM is shown to have violated the decree.

Although both DPF&G and ADR have based claims for damages partly on supposed violations by IBM of the Consent Decree, the largest part by far of ADR's monetary claims was on behalf of other firms who should have, according to ADR, benefitted from the Consent Decree. Applied Data asked, in a section of its complaint that has been ordered deleted, that IBM set aside over $3.5 billion for payment of potential claims, the total of which ranges from $9.6 billion to $13.8 billion or more. ADR claimed for itself about $300 million worth of damages due to alleged IBM violations of the Consent Decree.

If the ruling stands, the probable impact will be to lessen the amount of damages IBM will pay if it loses the cases. But the difference will not be critical to IBM's existence or to its ability to compete in the industry. This ruling, then, is important mainly to the parties directly involved in the suits and to third-party beneficiaries of ADR's "class action."

Both sides will start gathering evidence

A second and somewhat less dramatic ruling may have a more far-reaching effect on the computer industry. The order upholding the plaintiffs' joint plan for pre-trial discovery, with some qualifications, may affect the success or failure of the suits rather than just possible payments for damages.

The plaintiffs will be able to start immediately to question IBM and to ask it for documents. IBM has asked that it be allowed to conduct its own fact-gathering first, thereby having the chance to see what evidence the plaintiffs have (and perhaps move for a dismissal) before having to reveal any of its own records, but the motion was denied. Plaintiffs will be given access to the same kind of data that IBM has supplied to the Justice Department and to Congress, as well as access to internal IBM documents dealing with U.S. transactions.

Although at first glance this is just a matter of timing, with plaintiffs getting their information simultaneously with IBM rather than afterward, a delay would not only be costly but would allow unforeseen changes in the political climate to take place which might affect the outcome of the suits.

ADR charge stays in

An IBM motion to delete some other parts of ADR's complaint was denied. The complaint charged, among other things, that " . . . IBM has wrongfully and deceptively developed, fostered and maintained a viewpoint among computer users . . . that computer software is an intangible without market or property value . . . " In a later section, it said that "IBM has committed a fraud on the U. S. Patent Office by applying for and obtaining patents for computer systems based on software but disguised as hardware . . . " and " . . . has advocated the view in the U. S. Patent Office and among software innovators that computer systems achieved with software are not patentable subject matter."

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IBM objected on the grounds that this threatens its rights to influence public officials, but the court held that mention of attempts to influence the Patent Office was just incidental; the thrust of the allegations was to " . . . condemn as fraudulent and dishonest IBM's public utterances to the trade and to others."

Long-run consequences of the suits

To sum up -- the tally for IBM shows what looks like a hit and two misses. But the "hit" is not secure, and the importance of the "misses" has been given different weights by different observers.

There are three kinds of outcomes the antitrust litigation may have. IBM might be found to be blameless. Or, IBM may have to pay damages. In that case some firms will be richer and IBM will be poorer, but unless damages are so great as to jeopardize its position in the industry, the repercussions will stop there. And the third kind of outcome is that IBM could be restructured and have constraints put on its sale and lease policies. This result, with or without damage payments, will change the nature of competition in the computer hardware and software markets. For the industry as a whole, the primary importance of the pre-trial rulings lies in their impact on the granting of this kind of injunctive relief.

NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

COMPUTER KNOWLEDGE CORP.	Computer Knowledge Corp., 4502 Centerview Dr., San Antonio, Tex., a DP services and software firm, on Oct. 16, filed 200,000 common. Proceeds, at a price to be set by amendment ($6 max.), will be used for lease of a CDC 6400 computer and working capital. The underwriter will be Russ & Co., Inc., 1600 Alamo National Bldg., San Antonio.
HOSPITAL COMPUTER APPLICATIONS	Hospital Computer Applications, Inc., 777 Northern Blvd., Great Neck, N. Y., which plans to provide computer sharing services for hospitals and others, on Oct. 3, filed 100,000 shares common. Proceeds, at $7.50 per share, will be used for start-up costs, system development, and other corporate purposes. The underwriter will be Security Options Corp., 40 Exchange Pl., New York.
INFORMATION PROCESSING SYSTEMS INC.	Information Processing Systems, Inc., 467 Sylvan Ave., Englewood Cliffs, N. J., a used computer broker, on Oct. 24, filed 100,000 shares common to be offered at $6. Proceeds will help the firm enter the business of brokering software products and expand other marketing activities. No underwriter is involved.

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PORTANT CHANGES IN COMPUTER CENSUS

During the course of the computer industry's phenomenal growth, virtually very major firm with an interest in electronics, plus many smaller ones, has ttempted one way or another to manufacture a product for the growing computer arketplace. During the 12 to 15 year period during which such activity has been oing on, there have been dropouts, there have been mergers, there have been new ntries. Today, EDP/IR estimates, some 52 companies manufacture and market 325 ifferent models of central processing units.

And for over six years now, the International Data Corporation, publisher of EDP Industry Report, has been preparing and publishing a Census of digital computers, by model, installed and on order. Almost two years ago, we broke this down into its domestic and international components. Now, as a result of an extensive new analysis of IDC's data base, EDP/IR is pleased to offer the Computer Census in its most useful format yet.

Starting with this issue, the Census (pages 10 & 11) will be divided into two parts, to be run in successive months. These are:

- Group A -- General Purpose Digital Computers: These comprise the bulk of the computers that have been listed in the Census previously. They are character or byte oriented except in the case of the large-scale scientific machines, which have 36, 48, or 60-bit words. The predominant portion(60% to 80%) of these computers is rented, usually for $2,000 a month or more. Higher level languages such as Fortran, Cobol, or PL/1 are the primary means by which users program these computers.

- Group B -- Dedicated Application Digital Computers: This group of computers includes the "mini's" (purchase price below $25,000), the "midi's" ($25,000 to $50,000), and certain larger systems usually designed or used for one dedicated application such as process control, data acquisition, etc. The characteristics of this group are that the computers are usually word oriented (8, 12, 16, or 24-bits per word), the predominant number (70% to 100%) are purchased, and assembly language (at times Fortran) is the predominant means of programming. This type of computer is often sold to an original equipment manufacturer (OEM) for further system integration and resale to the final user.

In preparing the figures for this revised edition of the Census, we undertook a new intensive series of verification checks on the installed and on order counts for each computer model. These checks included revenue flow reviews for comparison with the financial reports of the manufacturers, statistical checks against plant census data, industry profiles, etc., as well as intensified attempts at direct confirmation from the computer manufacturers. The results of this analysis indicated that certain computer models had been somewhat over-or under-estimated in previous census reports. For this reason, there will be certain computer models in the current census for which a change from the previous census reflects, in part, a correction, not direct growth or decline. Therefore, direct comparison of the figures printed in the current census with those in previous census reports should be made with caution in cases where an apparently greater than normal increase or decrease in installations or orders is reported.

EDP/IR recognizes that, to some readers, a continuing plot of the census of

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computers, by manufacturer and model, is quite important. To satisfy this need, EDP/IR is planning to publish in its upcoming 1969 Review and Forecast issue a review of computer census activity for this year, with installed and on order figures for each model as of the end of each calendar quarter of 1969. This issue will be published during January. In the meantime, we would be happy to respond to any written requests from EDP/IR subscribers concerning census data. Address them to Census Editor, EDP Industry Report, 60 Austin St., Newtonville, Massachusetts 02160.

A NOTE ON BACKLOGS

Several people -- including some computer manufacturers — have commented publicly on the backlog figures for the industry contained in the Mid-Year Review issue (EDP/IR Sept. 11, 1969). Our backlog numbers appeared to be considerably lower than those being reported by certain computer manufacturers. The manufacturers' immediate reaction is that they are right, we are wrong. Not necessarily so. In fact, both may be right. Some definitions are necessary to clarify the situation.

The reason reported backlog positions in the computer industry may differ sharply is that "backlog" can be interpreted in different ways. The computer industry is different from other industries, because the majority of its equipment is rented by its customers. There is a gross backlog -- orders received, and not yet shipped. Then there is the new production backlog -- orders that will be filled by newly built systems. The difference between the two is in those orders that will be filled by shipping refurbished systems which were returned to the manufacturer by a previous user. At the current state of maturity of most of the families of computer systems, there is a low ratio of their new production backlog to gross backlog.

Manufacturers generally report their gross backlog in public statements. Our on order numbers reflect the new production backlog. We feel this new production backlog is declining over-all for the industry, although the gross value of shipments going off to the loading docks of the manufacturers is probably up a good percent over last year. This high gross shipment level is not adding significantly to the industry's rental base, however, because a good percentage of it is equipment which has recently been returned from another customer.

A third type of backlog figure sometimes used is net backlog. This is the absolute increase or decrease in the value of equipment installed at customer sites expected when all the equipment scheduled to be shipped, replaced or retired during a certain time period is taken into account. Net backlog is lower than the gross or the new production backlog because it accounts for the EDP equipment which will be returned from customer sites and retired, i.e., ending its revenue producing life for the manufacturer. Net backlog figures are very difficult to estimate, even for the computer manufacturer. His customers are often uncertain exactly when they will be able to return the equipment to the manufacturer, particularly when the equipment is not being replaced by other gear from the same manufacturer.

We put an "X" in the unfilled orders column when a computer model has no new production backlog. At the same time, this same computer model could have a gross backlog, albeit small, arising from people wanting to install the system, probably as an additional or backup system at their site. In the later stages of its market life, the planned retirements of the same computer model could have a significant impact on the level of the net backlog, while having no impact on the gross or new production backlog figures at all.

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GENERAL PURPOSE COMPUTER CENSUS

These counts for General Purpose Digital Computers (Group A) are based on e best information available to the International Data Corporation, but are timates only. As a rule, manufacturers in the computer industry do not supply is type of information. It is only through the use of IDC's extensive data les that such estimates are possible. Computers included in "Group A" com- rise the bulk of digital computers. They are byte or character oriented, with ne exception of large-scale scientific machines, and are programmed by users rimarily with the higher level languages. Next month, an issue of EDP Industry eport will include a census for "Group B," the system control computers (Mini- computers and Midicomputers). Note that these figures are not directly compar- able to census counts published in EDP Industry Report prior to November 28.

AS OF OCTOBER 1, 1969

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	205	$ 4,600	1/54	12	2	14	X
	220	$ 14,000	10/58	23	4	27	X
	B100	$ 3,300	8/64	77	10	87	X
	B200 Series	$ 5,500	11/61	425	74	499	X
	B300 Series	$ 8,000	7/65	525	126	651	31
	B500	$ 3,800	11/68	50	6	56	75
	B2500	$ 5,000	2/67	130	30	160	81
	B3500	$ 14,000	5/67	140	40	180	170
	B5500	$ 37,500	3/63	106	13	119	19
	B6500	$ 45,000	6/69	2	0	2	90
	B8500	$200,000	4/69	1	0	1	4
Control Data Corp.	G-20	$ 19,600	4/61	13	7	20	X
	1604/A	$ 42,000	1/60	32	9	41	X
	3100/3150	$ 10,500	12/64	71	38	109	10
	3200	$ 14,000	5/64	61	28	89	X
	3300	$ 20,500	9/65	111	51	162	28
	3400	$ 23,700	11/64	9	6	15	X
	3500	$ 25,000	1/69	4	1	5	19
	3600	$ 48,000	6/63	28	14	42	X
	3800	$ 53,000	12/65	18	3	21	X
	6400	$ 37,000	5/66	53	12	65	19
	6500	$ 58,000	12/67	7	2	9	3
	6600	$127,000	8/64	59	12	71	14
	7600	$240,000	1/69	1	0	1	6
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	18	3	21	X
	PDP-10	$ 11,000	10/67	76	21	97	32
Electronic Associates	8400	$ 12,100	6/65	20	6	26	1
General Electric	105	$ 1,350	7/69	15	15	30	185
	115	$ 2,200	12/65	430	725	1155	105
	130	$ 4,500	3/69	5	8	13	145
	205	$ 3,900	6/64	10	0	10	X
	210	$ 16,000	7/59	33	0	33	X
	215	$ 6,000	9/63	18	2	20	X
	225	$ 11,600	4/61	140	19	159	X
	235	$ 14,500	4/64	100	20	120	X
	245	$ 16,000	10/69	0	0	0	10
	405	$ 6,200	2/68	40	15	55	20
	415	$ 11,000	5/64	300	100	400	X
	425	$ 15,000	6/64	126	33	159	X
	435	$ 20,000	9/65	32	9	41	4
	615	$ 40,000	6/69	2	0	2	11
	625	$ 54,000	4/65	9	4	13	5
	635	$ 62,000	5/65	46	6	52	20
	645	$ 90,000	7/66	7	0	7	X
Honeywell	632	$ 7,000	12/68	2	0	2	34
	1648	$ 12,000	6/68	5	0	5	20
	H-110	$ 2,600	9/68	118	20	138	81
	H-120	$ 4,800	1/66	770	187	957	55
	H-125	$ 7,100	12/67	87	35	122	100
	H-200	$ 7,450	3/64	773	352	1125	55
	H-400	$ 10,600	12/61	52	37	89	X
	H-800	$ 26,000	12/60	60	14	74	X
	H-1200	$ 9,800	2/66	172	65	237	36
	H-1250	$ 12,000	8/68	131	13	144	85
	H-1400	$ 14,000	1/64	4	2	6	X
	H-1800	$ 46,000	1/64	15	4	19	X
	H-2200	$ 18,700	1/66	123	33	156	63
	H-3200	$ 22,000	2/70	0	0	0	20
	H-4200	$ 26,200	9/68	9	0	9	18
	H-8200	$ 50,000	2/69	4	1	5	16

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IBM	305	$ 3,600	12/57	22	50	72	X
	360/20	$ 2,900	12/65	6295	3800	10,095	4000
	360/25	$ 7,750	10/68	770	230	1000	3200
	360/30	$ 10,500	5/65	7400	3660	11,060	1595
	360/40	$ 19,300	4/65	2940	1250	4190	1500
	360/44	$ 12,000	7/66	145	47	192	42
	360/50	$ 32,000	8/65	1120	400	1520	570
	360/65	$ 60,000	11/65	515	130	645	400
	360/67	$138,000	6/66	40	10	50	30
	360/75	$ 81,400	1/66	44	15	59	7
	360/85	$155,000	10/69	0	0	0	23
	360/90 Series	$150,000	11/67	15	0	15	3
	360/195	$232,000	3/71	0	0	0	5
	650	$ 4,800	11/54	42	102	144	X
	1130	$ 1,700	2/66	3200	1055	4255	1000
	1401	$ 6,200	9/60	2400	2000	4400	X
	1401-G	$ 2,300	5/64	635	255	890	X
	1401-H	$ 1,300	6/67	150	70	220	X
	1410	$ 17,000	11/61	260	168	428	X
	1440	$ 4,100	4/63	1550	1145	2695	X
	1460	$ 9,800	10/63	240	88	328	X
	1620	$ 4,000	9/60	900	525	1425	X
	1800	$ 5,000	1/66	685	245	930	230
	7010	$ 26,000	10/63	87	13	100	X
	7030	$160,000	5/61	6	2	8	X
	704	$ 32,000	12/55	11	8	19	X
	7040	$ 25,000	6/63	57	40	97	X
	7044	$ 36,500	6/63	40	14	54	X
	705	$ 38,000	11/55	26	15	41	X
	7070, 2, 4	$ 27,000	3/60	200	80	280	X
	7080	$ 60,000	8/61	78	3	81	X
	709	$ 40,000	8/58	1	1	2	X
	7090	$ 63,500	11/59	36	36	72	X
	7094 I/II	$ 77,300	9/62;4/64	116	11	127	X
	System 3	$ 1,240	2/70	0	0	0	3000
NCR	304	$ 14,000	1/60	18	2	20	X
	310	$ 2,500	5/61	9	0	9	X
	315	$ 9,000	5/62	425	350	775	16
	315-RMC	$ 12,500	9/65	125	45	170	13
	390	$ 1,950	5/61	400	300	700	X
	500	$ 1,650	10/65	1700	900	2600	180
	Century-100	$ 3,600	9/68	282	38	320	1050
	Century-200	$ 6,500	6/69	10	2	12	390
Philco	1000	$ 7,010	6/63	13	1	14	X
	2000-210, 211	$ 40,000	10/58	12	1	13	X
	2000-212	$ 52,000	1/63	12	1	13	X
RCA	RCA 301	$ 7,500	2/61	385	200	585	X
	RCA 3301	$ 19,000	7/64	75	8	83	X
	RCA 501	$ 14,000	6/59	70	2	72	X
	RCA 601	$ 35,000	11/62	4	0	4	X
	Spectra 70/15	$ 4,500	9/65	110	80	190	14
	Spectra 70/25	$ 7,200	9/65	75	40	115	X
	Spectra 70/35	$ 12,000	1/67	130	84	214	75
	Spectra 70/45	$ 24,000	11/65	248	89	337	38
	Spectra 70/46	$ 33,400	11/68	15	0	15	24
	Spectra 70/55	$ 35,000	11/66	17	3	20	13
	Spectra 70/60	$ 38,000	9/70	0	0	0	6
	Spectra 70/61	$ 50,000	2/71	0	0	0	3
Scientific Control Corp.	6700	$ 16,000	2/70	0	0	0	1
Standard Computer Corp.	IC 4000	$ 9,000	9/68	6	0	6	3
	IC 6000	$ 16,000	5/67	7	0	7	X
	IC 7000	$ 17,000	6/69	2	0	2	8
Univac	I & II	$ 25,000	3/51;11/57	14	0	14	X
	III	$ 21,000	8/62	66	13	79	X
	File Computers	$ 15,000	8/56	7	0	7	X
	SS 80, 90 & Step	$ 8,000	8/58	91	64	155	X
	418	$ 11,700	6/63	101	52	153	11
	490 Series	$ 32,000	12/61	186	27	213	18
	1004	$ 1,900	2/63	1550	935	2485	X
	1005	$ 2,550	4/66	965	430	1395	X
	1050	$ 8,800	9/63	155	78	233	X
	1101-1105	$ 35,000	12/50	6	0	6	X
	1106	$ 37,000	2/70	0	0	0	15
	1107	$ 57,000	10/62	18	8	26	X
	1108	$ 68,000	9/65	155	57	212	101
	9200	$ 1,600	6/67	350	115	465	450
	9300	$ 4,800	9/67	195	65	260	355
	9400	$ 7,000	5/69	20	3	23	110
	LARC	$135,000	5/60	1	0	1	X
Xerox Data Systems	SDS-940	$ 25,000	4/66	51	4	55	19
	SDS-9300	$ 8,500	11/64	29	2	31	X
	Sigma 5	$ 7,000	8/67	88	35	123	56
	Sigma 7	$ 13,500	12/66	65	18	83	23
			Totals	43,999	21,757	65,756	20,287

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October 20, - November 7, 1969

	1969 High	1969 Low	3 week Sales in 100's	3 week High	3 week Low	Last	3 week Net Change	3 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	85	59 1/2	4756	76 1/2	71 3/8	74 1/4	- 2 3/4	- 3.57
American R & D	87 3/8	44	2350	87 3/8	72 3/4	86 1/4	+14	+19.38
Ampex Corp.	49 7/8	32 1/2	2999	49 7/8	44 3/8	49 1/4	+ 1 3/4	+ 3.68
Bunker Ramo	17 5/8	9 1/2	13905	16 3/8	14	15 3/8	+ 1 1/4	+ 8.85
Burroughs	167 1/2	120 3/4	4128	161 3/8	147	148 5/8	- 5 1/4	- 3.41
Collins Radio	69 3/4	38 5/8	1423	58 1/4	48 7/8	58	+ 7 1/2	+14.85
Computer Sciences	32 1/8	19 1/2	10379	32 1/8	24	32 1/8	+ 8 1/4	+34.55
Control Data	159 1/4	114 1/4	21469	150 1/4	114 1/4	120 1/2	-26	-17.75
Electronic Assoc.	25 1/4	13 1/4	1497	20 5/8	17 5/8	17 3/4	- 1 3/8	- 7.19
General Electric	98 1/4	81	4886	89 7/8	82 3/8	85	- 1 1/2	- 1.73
Honeywell	157 1/4	107 3/4	2077	157 1/4	147 3/4	152 3/4	+ 4 1/4	+ 2.86
IBM	365 1/4	291 3/4	3107	365 1/4	351	365	+14	+ 3.99
ITT	60 1/2	46 1/4	15916	60 1/2	54 7/8	58	- 1 3/8	- 2.33
Leasco	54	22 1/2	7885	33 5/8	28 1/2	28 5/8	- 7/8	- 2.97
Litton	74 1/2	37 1/8	8754	65 3/4	53 1/2	56	+ 1 7/8	+ 3.46
Memorex	167	65	6960	167	120 1/2	161	+39 3/4	+32.78
National Cash Register	150 1/2	108	3349	149 1/4	137	148	+ 5 1/2	+ 3.86
Planning Research	46 1/4	23 7/8	1450	46 1/4	39 7/8	46	+ 6 1/4	+15.72
RCA	48	35 1/2	4118	45	40	40 1/4	- 3 7/8	- 8.78
Raytheon	50 1/4	30 5/8	2838	42 5/8	36 7/8	37 7/8	- 3 3/8	- 8.18
SCM	47 1/8	27 7/8	2922	32 3/8	27 7/8	29	- 1/2	- 1.69
Sanders	61 7/8	22	6271	33	28 3/8	29 1/4	- 4 1/2	+13.33
Sangamo	43 1/2	19 1/4	2409	33 3/4	23 1/2	33 5/8	+ 9 7/8	+41.58
Singer	85 3/4	62	4037	85 3/4	74 3/8	85	+10 1/2	+14.09
Sperry Rand	55 1/2	38 3/8	9537	48 3/8	42 7/8	46 3/8	+ 2 3/8	+ 5.40
Teledyne	45 1/2	28 1/4	6047	44 1/4	39 5/8	41 5/8	+ 7/8	+ 2.15
University Computing	105 1/2	64 1/4	4648	105 1/2	85	104 7/8	+20	+23.56
Xerox	115	85 1/4	12188	115	102	109 1/4	+ 3/4	+ 0.69
NYSE COMPUTER STOCK AVERAGE							+ .21	+ 6.69
AMERICAN STOCK EXCHANGE								
Applied Data Research	32 7/8	19	698	26 5/8	21 1/4	24	+ 3 1/2	+17.07
Automatic D P	119 1/2	63 1/4	587	119 1/2	95 7/8	115	+19 1/2	+20.42
Calcomp	37 1/2	18 1/4	2241	35 3/8	24 1/2	34 1/2	+ 8 1/4	+31.43
Clary Corp.	25 3/4	9 1/2	674	13 3/4	10 7/8	13 1/2	+ 1 3/8	+11.34
Computer Applications	21 7/8	9 1/2	1103	16 7/8	11 1/4	14 1/2	+ 3 1/2	+31.82
Computing and Software	67 1/2	37	745	67 1/2	54	67 1/2	+14 1/8	+26.46
DPA, Inc.	13 5/8	8 1/8	2190	13 5/8	10 1/4	11 7/8	+ 1 5/8	+15.85
Data Proc. Fin. & Gen.	60 1/4	23 5/8	2942	39 3/4	33 1/2	37 1/8	+ 1 3/8	+ 3.85
Data Products	27 7/8	12 3/8	10233	21 3/8	16 3/4	20 1/4	+ 3 1/4	+19.12
Digital Equipment	93	54 1/2	2522	93	84 1/2	91	+ 6	+ 7.06
Granite Mgt.	45 1/2	16 3/4	1072	29 1/2	24 3/8	29	+ 3 1/2	+13.73
Greyhound Computer	28 5/8	12	918	18	13 3/4	16	+ 2	+14.29
ITEL	32 1/4	14 1/4	4515	32 1/4	17 1/8	28 3/8	+11 3/8	+66.91
Levin-Townsend Comp.	57 1/2	23 1/2	3348	33 1/2	28 1/2	31 1/8	+ 2 7/8	+10.18
Milgo Elect.	61	17 7/8	5578	61	39 3/8	54 1/4	+14 5/8	+36.91
Mohawk Data Sciences	89 1/8	59 3/4	4014	81 1/4	73	80	+ 5 3/8	+ 7.20
Potter Instrument	46	23 3/4	3541	46	37 1/2	38 1/2	- 2 7/8	- 6.95
Randolph Computers	44 7/8	18	1530	44 7/8	42	44 1/2	+ 2 1/2	+ 5.95
Sys. Eng. Labs.	50	26 1/8	3648	50	43 1/2	49 3/4	+ 4	+ 8.74
Telex	90 7/8	20 3/4	5218	90 7/8	76 1/4	81 1/8	+ 4 7/8	+ 6.39
AMSE COMPUTER STOCK AVERAGE							+ 5.54	+17.39

	1969 High Bid	1969 Low Bid	November 7, Bid	November 7, Asked	3 weeks ago Bid	3 week net change Bid	3 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	19	6	9 1/2	10	8 1/8	+ 1 3/8	+16.92
Bolt, Beranek & Newman, Inc.	19	7 1/2	15 3/4	16 1/2	15	+ 3/4	+ 5.00
Computer Usage	40	7 3/4	18	19 1/2	12	+ 6	+50.00
Cyber-tronics	13 7/8	7	13	13 1/2	13 1/2	- 1/2	- 3.70
Digitronics	22 1/2	13 1/2	16 1/4	17 1/4	18 1/2	- 2 1/4	-12.16
Fabri-Tek	12 7/8	6 3/8	8 3/8	8 7/8	8	+ 3/8	+ 4.69
Informatics, Inc.	30 1/4	11 3/4	18	18 3/4	16 3/4	+ 1 1/4	+ 7.46
LMC Data, Inc.	8 1/4	3 1/8	3 1/4	3 3/4	3 1/4	--	--
Management Assistance	14 7/8	2 3/4	3 1/2	3 7/8	4 7/8	- 1 3/8	-28.21
Optical Scanning Corp.	118	41	59	62	43	+16	+37.21
Recognition Equipment Inc.	76	52	70 1/2	72	66 3/4	+ 3 3/4	+ 5.62
TBS Computer Centers Corp.	36	11	18 3/4	19 3/4	21	- 2 1/4	-10.71
Tally Corp.	36	15	23	24 1/2	26 1/2	- 3 1/2	-13.21

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" DECEMBER 31,1969 • VOL.5,NO.5 P.J.McGOVERN,EDITOR

Potential threat to AT&T's data transmission business?

FOLLOWING FCC APPROVAL OF A CHICAGO-ST. LOUIS MICROWAVE DATA LINK, SEVERAL COMPANIES FILE FOR HIGH-SPEED DATA TRANSMISSION SYSTEMS

When the Federal Communications Commission handed down its final decision in the long-contested Carterfone case (EDP/IR Nov.19,1967), it freed users of data communications equipment from being required to use data sets or modems supplied by AT&T through its Bell System operating subsidiaries. To this, AT&T's chairman, H.I. Romnes, keynote speaker for the 1968 Spring Joint Computer Conference, said that any losses in Data-Phone rentals should be more than offset by increased line usage for remote data services.

Now -- if the FCC follows guidelines from the precedent possibly set in August when it granted Microwave Communications, Inc. permission to build a microwave link between Chicago and St. Louis -- AT&T may be about to lose some business it had counted on when its chairman made the above statement. Several announcements during the last few months, most recent of which was made on Dec. 17, 1969, could lead to effective competition with AT&T in data transmission and with portions of Western Union's message transmission service.

This situation has not sprung up overnight; aspects of it, in fact, have been on the horizon for several years. But it is only in the last several months -- as the original MCI company has gone ahead with construction of its Chicago-St. Louis link -- that the FCC has received applications from a number of small, gutsy companies eager to compete with the U.S.'s regulated communications carriers.

Over three years ago, the FCC announced a "sweeping inquiry into the interrelationships between computers and communications"(EDP/IR Nov.15,1966). At the time of the inquiry's announcement, we applauded the foresight on the FCC's part; now, however, after three years of apparently dillydallying around, the FCC has accomplished little and we must express concern over the resultant situation. Indeed, the FCC is now being forced to do exactly what the original inquiry was to have precluded: No real guidelines have been set down and each individual case, essentially, is being heard on an individual basis. Here are some of the latest developments in the field of data transmission:

- In the wake of the decision favorable to MCI, four MCI-type companies have applied to the FCC to offer similar services over private, leased microwave channels. A fifth has had a similar application pending since 1968, and plans to join the MCI network. In addition, a non-MCI company now transmitting TV broadcasts has just filed for an MCI-like system.

E|D|P Industry Report and Market Review, formerly **E|D|P Industry and Market Report,** is published twenty-four times each year by the International Data Publishing Co., 60 Austin Street, Newtonville, Mass. 02160. Entire contents © 1969 by the International Data Corporation. James Peacock, Managing Editor; Fred Anderson, Carol Chapman, Associate Editors; William Leitch, Contributing Editor; Walter Misdom, Director of Industry Analysis; A. Whelan, Circulation Manager. Editorial ideas and information are collected from numerous industry experts, and are researched and formulated by members of the editorial staff. The information and opinions contained in each issue are based on the best information available, but their accuracy and completeness cannot be guaranteed. Subscriptions: One Year, $75. Single copies, priced as indicated on inside pages, air-mailed same day requested. Prices for multiple copies available on request. Telephone (617) 969-4020. Reproduction without written permission is completely forbidden.

- A central coordinating company, Microwave Communications of America (Mi-Com), has been formed to blend the activities of all the MCI-type companies into a nationwide microwave network serving 160 metropolitan areas. It will provide marketing support for the entire network. Mi-Com is also investing in each of the MCI-type companies, and its board chairman, William McGowan, is on the board of most of the companies in the proposed network.

- As the MCI network was announced at mid-month, the FCC was holding hearings on the possible use of existing CATV systems and the proposed MCI data links for the transmission of educational television programs . . . and possibly as a data transmission network for swapping computer data among colleges and universities.

- And University Computing Co. -- staking a large portion of its future on becoming "the multi-national computer utility" -- has formed a wholly owned subsidiary called Data Transmission Co. Datran, as this subsidiary is called, has applied to the FCC to establish a $375 million switched network for public data transmission. This, a Datran spokesman says, will provide 35 metropolitan areas with a "faster, more reliable, and more economical transmission service" . . . if the FCC approves. Datran is headed by Seymour (Sy) Joffe, long-time UCCer and an accomplished pioneer in teleprocessing.

The overview for MCI, UCC, and others

If the MCI decision did set a precedent and, as such, give a foot in the door to hungry outsiders, then UCC's Datran has high hopes that it can rush quickly in behind the MCI-type companies, entering the data transmission field before the door is possibly slammed in its face. Other groups, of course, may also try to follow, but once Datran and the MCI-type companies have entered the arena, there is a good case for speculating that these two groups might very well give the FCC tacit support -- from the inside, as it were -- in bolting the door before others reach for the handle. In any event the FCC, if it already hasn't, will finally be forced to make policy decisions about data communications.

For one thing, the MCI decision -- with all its filings and hearings that took almost six years -- was close: Two Commissioners issued dissenting statements, one of which was "joined" by a third Commissioner; and even a fourth member of the seven-man Commission concurred with the FCC decision but issued a separate statement.

Since the MCI decision, interestingly, two of the dissenting Commissioners' terms have run out and they have been replaced by Nixon appointees. But while two potential negative votes are gone, political affiliations of the incoming regulators provide no clear signal as to how they will view increased competition in the communications industry from new-style data common carriers. For example, Commissioner Nicholas Johnson, in his separate but concurring statement, offers an interesting view of the situation from a "party" standpoint:

> On this occasion three Commissioners are urging a perpetuation of more government regulation of business, and four want to experiment with the market forces of American free private enterprise competition as an alternative to regulation. Of course, such a coincidental division is not a "party" matter at all. Quite the contrary. It is simply another indi-

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cation of the passing of ideology in this pragmatic age: an age when Democrats proposed selling the "socialistic" Post Office for the highest corporate bidder to run at a profit, and Republicans propose a guaranteed income welfare program that, in an earlier age, they would have called "from each according to his ability, to each according to his need."

And as the partially changed Commission begins to hear testimony from the growing number of applicants for microwave transmission systems, the major communications carriers -- led by AT&T -- are expected to fight hard to keep out any more of the "upstarts." In the original case, finally decided in MCI's favor, charges of "cream-skimming" and "no need" were hurled about freely by the communications companies. Similar arguments -- in spades -- can be expected as more and more applications roll in (see Table 1). This will especially be true as the hearings for UCC's Datran begin, since UCC is a diversified company that has subsidiaries or corporate activities in terminal manufacturing, computer leasing, on-line batch processing, and time sharing. Also, it asks for one unified network in a single filing . . . rather than seeking approval piecemeal, as are the MCI-type companies in setting up their network.

Table 1--FACTS ABOUT MICROWAVE DATA SYSTEMS ANNOUNCED TO DATE

Company Name	Date Announced	Area To Be Served	Number of Relay Sites	Planned Costs ($ Millions)
MCI	1963	Chicago-St. Louis	9	0.564
Interdata Communications*	12/68	NYC-Washington	9	1.2 initial, and 0.9 for expansion
MCI-N.Y. West	9/18/69	NYC-Chicago	65	8
MCI-Pacific Coast	11/6/69	San Diego-Seattle	54	6
MCI-North Central States	11/25/69	Minn.-St. Paul to Chicago	16	2.5 initial, and 10 for expansion
Data Transmission Co.	11/25/69	35 metropolitan areas	244	375
New York Penn Microwave Corp.	11/28/69	NYC-Chicago	67	10
MCI-New England	12/11/69	Boston-Providence to NYC	17	3 initial, and 18 for expansion

*Now planning to be a part of the proposed MCI network

NOTE: The planned nationwide MCI network, announced 12/17/69 and to be coordinated through Mi-Com, will include the six companies indicated above plus an additional 10 which have yet to file with the FCC. For this network, a total of $150 million is planned for initial construction, with an additional $535 million to be available for expansion.

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Also, additional voices from within the computer industry (from such groups as hardware manufacturers and, especially, time-sharing companies) may object to the proposed joining of unregulated computer and regulated communications services within one corporate family. It seems to EDP/IR, however, that the volume of such possible complaints will depend largely on whether the proposed data communications networks offer new areas for increased hardware sales, lower costs for on-line data-oriented services, or some other financial advantage that will add sparkle to their income statements. And -- Who knows? -- some of these companies may well decide to file for entry into the data transmission field themselves.

The battle behind the MCI decision . . . and its plans

MCI's Chicago-St. Louis microwave route was initially proposed by John Goeken, president of the company, in 1963. The case finally edged its way past the FCC examiners and two years ago received the examiners' recommendation that the application be granted. Additional hearings consumed another two years, and finally, on August 14 of this year, Goeken got his license by a 4-to-3 vote from the FCC. During this period, MCI is reported to have spent $350,000 waging its campaign.

About a year ago, an independently established firm named Interdata Communications Inc. filed for a similar link between New York City and Washington, D.C. Hearings may start soon for this company, which will join the MCI network and is over one-third owned by Mi-Com. This, plus the four MCI-type companies that have filed with the FCC since August and the 10 more that are planned (see Table 1), will bring the MCI network up to 16 companies . . . all with local financing as well as their Mi-Com affiliation.

If enough of these MCI-type companies get FCC licenses -- and the outcome in the next one or two hearings will probably determine whether or not the "MCI National Network of Customized Communications Carriers" will become a reality -- they will begin to offer relatively low-volume communications users access to the same kind of data-oriented transmission facilities now enjoyed by users of private microwave systems. Ultimately, the MCI network "would be able to offer service to almost 90% of the country's computer time-sharing companies and more than 85% of the manufacturers and retailers in 160 metropolitan areas." And in the first link between Chicago and St. Louis, says Mi-Com's McGowan, the results look better than anticipated. By mid-1970, when this first link will be operational, 200 channels will be in operation, although for arguing its financial prospects before the FCC, MCI anticipated only a market of 75 channels during its first six months of operation.

MCI claims that its service will differ from traditional leased-line offerings by the telephone company on a number of counts:

- Prices will be lower;
- Part-time use and channel sharing will be allowed;
- Error rates will be much lower;
- The customer can connect whatever terminal equipment he likes;
- A number of different bandwidths will be available.

The telephone system, says MCI, is designed primarily to provide high-quality voice transmission and, therefore, is not suited to the requirements of data communications users. This claim seems to be born out by the voluminous amount of response to the FCC computer/communications inquiry. Private microwave systems, now legal, overcome these problems, but how many computer users can afford them?

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UCC takes the "one-shot" approach but expects long wait

With its Datran application, University Computing Company will probably have an even tougher time than the MCI companies in obtaining a license from the FCC. The Texas-based "compuglomerate" has been attempting to nose its way into the communications common carrier field for some time now. It failed in an attempt during 1968 to acquire Western Union through a tender offer. Now, UCC has its foot in the CATV business through its subsidiary TransAmerican Microwave, Inc.

This California company's CATV microwave facilities cannot carry data communications without FCC approval, and presently is not scheduled to be part of the Datran network proposed by UCC. When UCC asked the FCC for permission to acquire the TransAmerican stations, however, MCI opposed the purchase because, it claimed, this would lead to non-regulated computer and regulated communications services being offered by the same company . . . without a major policy decision having been made by the FCC on this issue.

UCC apparently doesn't consider this such a problem. While it says that it would be a major user of the proposed Datran national microwave data transmission network, it points out that Datran's services will be offered to all comers on the same basis. Whether a disinterested separation of parent company and its subsidiary can, in fact, be maintained is another question.

Datran's service differs significantly from the proposed MCI network. Datran will offer a switched digital transmission service (much like the Bell system, except designed for data only), rather than a point-to-point system based primarily on individual or shared private leased channels. The initial Datran proposal, conservative in nature, is designed to accommodate less than 10% of the anticipated 1973-1974 data communications traffic. But the system is designed for rapid expansion. Thus, if both Datran and the MCI-type companies receive FCC approval -- and AT&T files and is not denied tariffs for similar data services -- the seventies will certainly see competition in data communications traffic.

A final decision on this, especially in Datran's case, will likely be some time in the making. For one thing, the FCC appears to be a very deliberative regulatory commission. In the MCI hearings, the Commission would not take "official notice" of the comments filed in the original inquiry into the computer/communications relationship, concluding that "no purpose would be served by examining the comments . . ." This may be true. But it is hard to see how the Datran application can be considered in any light other than that shed by this inquiry.

The case presented by the common carriers

Even though the FCC refused to take official notice of the mounds of documents that have been submitted in its original inquiry into the subject under discussion, it did recognize that far-reaching issues were involved when it granted -- by the barest possible margin -- a common carrier status to Microwave Communications Inc. And in the August opinion, the FCC emphasized that future MCI applications for additional frequencies or geographical coverage would receive the very closest of scrutiny. Much of this reluctance to make a policy decision most likely was predicated on the objections raised by AT&T, Western Union, General Telephone, and other common carriers.

One major battlecry of current common carriers is "cream-skimming." In opposing the MCI application, they argued that MCI was able to under-price them

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along the Chicago-St. Louis route because it didn't have to provide service -- at a higher cost -- along less heavily used routes. This "cream-skimming" argument emphasizes the "national rate-averaging" principle of utility rate-making: High volume routes should subsidize low-volume ones so that prices to customers in rural and metropolitan areas are the same. This brings up a cloudy and controversial area -- currently being explored in other FCC hearings -- as to what principles should apply to rate-making. There is definitely an unresolved question as to whether some kinds of services should subsidize other kinds.

A second argument presented by the carriers in the MCI case is that there is no need for such special communications services. On this point, says one knowledgeable observer, "AT&T was hoist with its own petard" when the FCC took note of a statement in the letter of transmittal accompanying Bell's proposal for a new Series 11,000 tariff (put into effect Nov. 1 for a three-month trial): "The characteristics of the service offering for the [Series 11,000] channels have been structured to be similar to those of customer-provided microwave systems."

Other, somewhat overlapping arguments of the major carriers against MCI's proposal include: MCI is not financially qualified to construct and operate the proposed system; the system would be unreliable; MCI plans to make inefficient use of the frequency spectrum; and, the proposal is not technically feasible. In addition, at least in the MCI case, the carriers question MCI's ability to connect its transmission towers with its customers.

This last question comes up because the MCI-type companies do not propose to provide local "loop" service that connects the microwave towers to the customers' premises. Thus, subscribers will have to obtain their own interconnections, either via a customer-owned microwave link or via the local telephone network, probably using private leased lines. Although the carriers argued that this interconnection was not feasible, the Commissioners purposely retained jurisdiction over this matter in the original MCI case so that the question could be resolved speedily. The FCC noted in its opinion: What seems a more likely obstacle to interconnection is, as the Hearing Examiner indicated, the "carriers' intransigence, manifested in this case, . . ." rather than infeasibility.

Who gains if the applications go through?

As in most cases that get bogged down in red tape, the user will be the loser -- for a time at least -- no matter what happens. Even if the microwave companies' requests are granted, things will get worse before they get better. It will take either Datran or MCI-type companies another three or four years to get their full networks into operation, although individual links can be operating earlier.

These would-be communications carriers surely stand to gain. How much, of course, depends on how high a return on their rate base the FCC will allow if it regulates tariffs, as undoubtedly it will. Also, there is the question: Will the FCC continue to allow new microwave carriers to enter the competition?

AT&T and the other common carriers may lament, but they have no need to drag out crying towels immediately. There is an increasing demand for voice transmission in itself, and it will be at least five years or more before the proposed new data common carriers can have physical plants that could possible remove all the high-speed data business from the present common carriers. Also, these carriers already are filing tariffs that effectively will allow them to compete -- now -- with the services still just proposals by the new data carriers.

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Manufacturers of communications equipment and, indeed, of all communications-oriented computer hardware will gain sales as users carry out their plans for more communications-oriented operations. A study by the International Data Corp., publisher of EDP/IR, found, in late 1968, that the data communications terminal market will grow at a rate of 20% to 28% over the next several years. This growth rate is nearly twice that of the computer industry as a whole. Other IDC surveys, this year, show this rate to be conservative, if anything.

Finally, nationwide data carriers probably imply a shakeup among the 150 or so companies now offering Rair (Remote Access/Immediate Response) services. Reduced communications costs will no longer give small companies protection in local markets, and the Rair industry will become more concentrated. Both computer utility companies and large in-house data processing users will likely start taking economic advantage of large computers and centralized data bases.

Prognosis

It seems to EDP/IR that, to a large extent, the problems being discussed or at least mentioned in this issue of the newsletter are creatures of inaction on the part of the Federal Communications Commission. The FCC began its look into this admittedly complicated and involved area at an early time in its development; but, again, technological growth has apparently outpaced the present ability of a Governmental regulatory body to anticipate and react.

This view is continually reflected in Commissioner Johnson's concurring but separate statement in the MCI decision. In his five-page statement, Johnson points out that the FCC has no "philosophy, or statement of policy, regarding telephone regulation objectives," then goes on to say that to argue about cream-skimming is a little too late at this time. Then, concluding his statement, Johnson says:

> We can never know that a new product or service offered in the marketplace will become economically viable. Henry Ford couldn't know for sure. We cannot know for sure about MCI. Those who do business with MCI are getting a special service; it may be, for some, less satisfactory than the services offered by Bell; it will be, for all who use it, much cheaper. Presumably the consumers who will now have a choice will exercise it in the manner best suited to their interests. We have long authorized private microwave systems for individual companies servicing their own needs; MCI will simply be doing for a small group of users what each could have done for itself, had it the volume of business to justify the investment. Competition need not be so unusual. We are even experimenting with increased competition in the sources of equipment that can be "plugged into" the telephone system -- equipment known to the Bell Telephone-Western Electric complex as "foreign attachments."
>
> No one has ever suggested that government regulation is a panacea for men's ills. It is a last resort; a patchwork remedy for the failings and special cases of the marketplace. Some have urged the case that government regulation results in higher prices and less technological innovation and that, in almost every instance, the country would be better off with unregulated and unprotected monopolies. . . I am not prepared to go quite so far. But I am not satisfied with the job the FCC has been doing. And I am still looking, at this juncture, for ways to add a little salt and pepper of competition to the rather tasteless stew of regulatory protection that this Commission and Bell have cooked up.

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November 10, - December 12, 1969

NEW YORK STOCK EXCHANGE	1969 High	1969 Low	5 week Sales in 100's	5 week High	5 week Low	Last	5 week Net Change	5 week % Change
Addressograph-Multigraph	85	59 1/2	3437	74	63 3/4	65 7/8	- 8 3/8	-11.28
American R & D	89 1/4	44	2892	89 1/4	72	82	- 4 1/4	- 4.93
Ampex Corp.	49 7/8	32 1/2	3562	49 3/4	42	45	- 4 1/4	- 8.63
Bunker Ramo	17 5/8	9 1/2	5978	15 7/8	12 3/8	14	- 1 3/8	- 8.94
Burroughs	167 1/2	120 3/4	7384	162 1/4	144 1/4	161	+12 3/8	+ 8.31
Collins Radio	69 3/4	36 1/8	1761	58 7/8	36 1/8	38 1/4	-19 3/4	-34.05
Computer Sciences	34 3/4	19 1/2	16071	34 3/4	26 5/8	31 1/8	- 1	- 3.11
Control Data	159 1/4	110	9654	120 5/8	110	117 1/4	- 3 1/4	- 2.70
Electronic Assoc.	25 1/4	10	2540	18 1/8	10	11 3/4	- 6	-33.80
General Electric	98 1/4	76 1/4	8290	85 5/8	76 1/4	78 5/8	- 6 3/8	- 7.50
Honeywell	157 1/4	107 3/4	1952	152 3/4	141 1/2	148	- 4 3/4	- 3.11
IBM	368 3/4	291 3/4	5887	368 3/4	344 1/4	359 1/2	- 5 1/2	- 1.51
ITT	60 1/2	46 1/4	17472	59	54 3/4	55 1/8	- 2 7/8	- 4.96
Leasco	54	22 1/5	6530	29 3/8	23	24 1/4	- 4 3/8	-15.28
Litton	74 1/2	35 5/8	17108	56 5/8	35 5/8	38 1/2	-17 1/2	-31.25
Memorex	173 7/8	65	11494	173 7/8	147 1/2	162 1/8	+ 1 1/8	+ 0.70
National Cash Register	150 1/2	108	4625	150 1/2	138 1/2	148 3/4	+ 3/4	+ 0.51
Planning Research	48 7/8	23 7/8	2487	48 7/8	42 1/2	46 1/4	+ 1/4	+ 0.54
RCA	48 1/8	34 7/8	8029	41 1/2	34 7/8	36	- 4 1/4	-10.56
Raytheon	50 1/4	30 5/8	2591	39 3/8	33	33 1/2	- 4 3/8	-11.55
SCM	47 1/8	22	3660	29 1/2	22	23	- 6	-20.69
Sanders	61 7/8	22	4736	30 3/8	22 1/2	25	- 4 1/4	-14.53
Sangamo	43 1/2	19 1/4	3049	35 1/2	23	24 5/8	- 9	-26.77
Singer	87 7/8	62	3122	87 7/8	78	83 1/8	- 1 7/8	- 2.21
Sperry Rand	55 1/2	38	10826	46 5/8	38	38	- 8 3/8	-18.06
Teledyne	45 1/2	28 1/4	6613	42 3/4	34 1/2	35 3/8	- 6 1/4	-15.02
University Computing	111 1/2	64 1/4	10988	111 1/2	85	105 1/2	+ 5/8	+ 0.60
Xerox	115	85 1/4	10623	110	101	107 1/8	- 2 1/8	- 1.95
NYSE COMPUTER STOCK AVERAGE							- 4.32	-10.06
AMERICAN STOCK EXCHANGE								
Applied Data Research	32 7/8	19	3708	27	19 1/4	23 3/4	- 1/4	- 1.04
Automatic D P	122	63 1/4	727	122	102	107 1/2	- 7 1/2	- 6.52
Calcomp	37 1/2	18 1/4	2403	36 1/8	25 1/8	26 3/8	- 8 1/8	-23.55
Clary Corp.	25 3/4	9 3/8	871	13 7/8	9 3/8	9 1/2	- 4	-29.63
Computer Applications	21 7/8	9 1/2	611	14 1/2	10 1/4	10 5/8	- 3 7/8	-26.72
Computing and Software	72 3/4	37	2402	72 3/4	58	63 5/8	- 3 7/8	- 5.74
DPA, Inc.	13 5/8	8 1/8	1425	12 3/8	9 1/8	9 5/8	- 2 1/4	-18.95
Data Proc. Fin. & Gen.	60 1/4	23 5/8	3126	38 1/4	30 1/2	31	- 6 1/8	-16.50
Data Products	27 7/8	12 3/8	13494	23 3/4	16 3/4	22 3/4	+ 2 1/2	+12.35
Digital Equipment	102 1/4	54 1/2	3540	102 1/4	88	93 3/4	+ 2 3/4	+ 3.02
Granite Mgt.	45 1/2	16 3/4	1193	30 1/2	22 1/4	22 1/4	- 6 3/4	-23.28
Greyhound Computer	28 5/8	12	955	18	12 7/8	13 1/2	- 2 1/2	-15.63
ITEL	37 3/8	14 1/4	6627	37 3/8	27 1/4	37	+ 8 5/8	+30.40
Levin-Townsend Comp.	57 1/2	17 1/2	4688	32 1/8	17 1/2	19 1/2	-11 5/8	-37.35
Milgo Elect.	70	17 7/8	8945	70	45 1/8	68 1/4	+14	+25.81
Mohawk Data Sciences	89 1/8	59 3/4	2848	80 1/2	69	71 1/2	- 8 1/2	-10.63
Potter Instrument	46	23 3/4	4145	41 1/4	32	35 3/4	- 2 3/4	- 6.18
Sys. Eng. Labs.	53 7/8	26 1/8	8699	53 7/8	41 1/8	50 3/4	+ 1	+ 2.01
Telex	111 3/4	20 3/4	13118	111 3/4	71 1/4	108 1/2	+27 3/8	+33.74
AMSE COMPUTER STOCK AVERAGE							- 6.25	- 6.02

OVER-THE-COUNTER	1969 High Bid	1969 Low Bid	Dec. 12, Bid	Dec. 12, Asked	5 weeks ago Bid	5 week net change Bid	5 week % change Bid
Aries Corp	19	6	6 1/4	6 3/4	9 1/2	- 3 1/4	-34.21
Bolt, Beranek & Newman, Inc.	19	7 1/2	13 1/4	14	15 3/4	- 2 1/2	-15.87
Computer Usage	40	7 3/4	11 1/2	12 1/4	18	- 6 1/2	-36.11
Cyber-tronics	13 7/8	7	10	10 1/2	13	- 3	-23.08
Digitronics	22 1/2	13 1/2	14 3/4	15 3/4	16 1/4	- 1 1/2	- 9.23
Fabri-Tek	12 7/8	5 7/8	6	6 1/2	8 3/8	- 2 3/8	-28.36
Informatics, Inc.	30 1/4	11 3/4	16 1/2	17	18	- 1 1/2	- 8.33
LMC Data, Inc.	8 1/4	2 1/2	2 5/8	3 1/8	3 1/4	- 5/8	-19.23
Management Assistance	14 7/8	2 3/8	2 5/8	3	3 1/2	- 7/8	-25.00
Optical Scanning Corp.	118	41	52	55	59	- 7	-11.86
Recognition Equipment, Inc.	76	52	72	73	70 1/2	+ 1 1/2	+ 2.13
TBS Computer Centers Corp.	36	11	19	20	18 3/4	+ 1/4	+ 1.33
Tally Corp.	36	15	17	18 1/2	23	- 6	-26.09

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JANUARY 21,1970 • VOL.5,NO.6 P.J.McGOVERN,EDITOR

MINICOMPUTER SHIPMENTS, BY NUMBER, INCREASING FASTER THAN GENERAL-PURPOSE MARKET; COMPETITION IS KEEN: NEW TECHNOLOGY AND PARTICIPANTS BRING DOWNWARD PRICE SPIRAL

> If she can only cook as well as Honeywell can compute.
>
> Her souffles are supreme, her meal planning a challenge? She's what the Honeywell people had in mind when they devised our Kitchen Computer. She'll learn to program it with a cross-reference to her favorite recipes by N-M's own Helen Corbitt. Then by simply pushing a few buttons obtain a complete menu organized around the entree. And if she pales at reckoning her lunch tab, she can program it to balance the family checkbook. 84A $10,600.00 complete with two week programming course
> 84B Fed with Corbitt data: the original Helen Corbitt cookbook with over 1,000 recipes $5.00

-- *from* The Neiman-Marcus Christmas Book 1969

Neiman-Marcus didn't sell any Honeywell DDP-316s as advertised (above) in its 1969 Christmas catalog (Reports are the display helped sell cookbooks!); neither did it sell its most extragavant item in the same book -- 100,000 gallons of "his" favorite cologne, delivered, for $5 million. A few computer sales leads have come in to Honeywell. But the mere suggestion that the minicomputer is a potential consumer product is highly indicative of the future for smaller and smaller computers sold at lower and lower prices to more and more people. There are several reasons why this is the present trend, and why it is one that can be expected to continue:

- The cost for medium- and large-scale integration is coming down to competitive levels.
- As the cost and size of circuitry is reduced, splinter groups are more prone to leave still-new companies, spawning even newer ones based on a more efficient computer design and new marketing ideas.
- More and more OEM companies are using minicomputers as components for equipment which they build for many special purposes.

EDP Industry Report and Market Review, formerly **EDP Industry and Market Report,** is published twenty-four times each year by the International Data Publishing Co., 60 Austin Street, Newtonville, Mass. 02160. Entire contents © 1969 by the International Data Corporation. James Peacock, Managing Editor; Fred Anderson, Carol Chapman, Associate Editors; William Leitch, Contributing Editor; Walter Misdom, Director of Industry Analysis; A. Whelan, Circulation Manager. Editorial ideas and information are collected from numerous industry experts, and are researched and formulated by members of the editorial staff. The information and opinions contained in each issue are based on the best information available, but their accuracy and completeness cannot be guaranteed. Subscriptions: One Year, $75. Single copies, priced as indicated on inside pages, air-mailed same day requested. Prices for multiple copies available on request. Telephone (617) 969-4020. Reproduction without written permission is completely forbidden.

As a result of such factors -- and the continual decrease in average cost of the "black box" at the heart of the minicomputer -- this industry continues to look less like a sub-portion of the general-purpose computer industry and more like a portion of the multi-faceted electronic equipment market. The only way this business can really remain a true part of the computer industry is for suppliers to offer specialized programming, on minicomputers, for one or more particular jobs -- thus offering, on a mini-scale, the same added support values that separate most general purpose computers from other large electronic equipment.

And, interestingly enough, it is in this particular area that minicomputers compete for customer dollars with suppliers of Rair services: The Rair marketer who provides, primarily, computational time sharing has found himself in a marketplace mainly competitive on a dollars and cents basis. However, only Rair services that essentially use time-sharing terminals as connecting links to specialized software or large data bases stand to make significant long-range profits with today's computers; likewise, only the minicomputer manufacturer or supplier with specialized software (value added) can lift himself out of electronic manufacturing into the generally more profitable area of data processing.

The above discussion, of course, is long-range. Today, there is still tremendous competition within the equipment marketplace. Continuing research efforts by the International Data Corporation, publisher of EDP Industry Report, indicate the following trends within the minicomputer market:

- The market for minicomputers is growing rapidly, but has not sustained the annual doubling pace originally predicted for the early 1970s. Sales are increasing 40% to 50% a year, by number, but only 30% to 35% by dollar value, as average prices continue to decrease.

- Already, the marketplace is fairly crowded. EDP/IR's new Group B Census (see pages 6 and 7) shows that, at mid-fall, there were almost 100 minicomputer models from some 35 different manufacturers in use today.

- No single company has the marketplace dominance that IBM has in the general-purpose area. Digital Equipment Corp., however, has over six times the market base and four times the 1969 shipments of any competitor.

The table below shows how the primary mini manufacturers stack up in terms of the number -- now value -- of U.S. minicomputer installations and shipments for 1969.

MINICOMPUTERS: % U.S. MARKET SHARE BY NUMBER OF SYSTEMS

Manufacturer	Installed 10/1/69	Shipments 1969 (est.)	Manufacturer	Installed 10/1/69	Shipments 1969 (est.)
DEC	51%	32%	Raytheon	3%	1%
Honeywell/CCD	8	8	SCC	3	4
XDS	6	2	Data General	2	5
Varian	6	7	BIT	1	2
Interdata	4%	7%	CAI	1%	4%
SEL	4	5	H-P	1	7
EAI	3	0	Lockheed	1	4
GAI	3	5	Others	3	7

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The above table shows -- dramatically -- that DEC's dominance of the minicomputer marketplace is definitely on the decline. This is due, in part, to the sheer rash of new companies entering the marketplace with competitive equipment. Also, Digital's computer output presently is split almost 50-50 between minis and the larger PDP-10 computer. DEC is one of the few computer manufacturers truly in the general-purpose (Class A) and dedicated application (Class B) markets.

Another, perhaps more important observation from the table is that the 35 or so "other" companies attempting to penetrate the minicomputer marketplace must fight for their share against two different factors:

- Digital, still the prime manufacturer of minicomputers, can be expected to fight harder at least to retain its present position.

- Although a few companies in the top 15 (by installed base) are really no longer concentrating on the minicomputer market, at least 10 of them have plans for further penetration of the market.

The net result of these two factors is a competitive environment in which the newcomer faces real competition from two different directions. Today's newcomer, therefore, must either (1) offer to the marketplace a minicomputer with technological improvements that give it a distinct price/performance advantage over the competition; or (2) introduce a machine with either software or "firmware" (the instructions for a special function or job actually embedded in the electronic circuitry) that allows it to sell in markets which heretofore have not been using minicomputers for specialized applications.

None of the factors above are meant to imply that the existing market for minicomputers has been saturated; indeed, there is room in the marketplace for a company to sell products with either (or both) the above characteristics. But today, with budgets undergoing general belt-tightening across the country -- even in computer procurements -- the successful small company in the minicomputer market will be one that has good management and marketing skills, rather than mere technological excellence.

Certainly, there is still a market where the "buy" decision is made or highly influenced by the technically oriented person within a customer organization. And, as is well known, these people often hide purchases of minicomputers in budgets under such headings as laboratory equipment, components, or the like. This portion of the market, however, has decreased from 35% in 1967 to about 20% now.

Shipments of computers to OEM manufacturers, during the same period, has gone from 35% to 45%. And in that portion of the market where real growth potential lies -- the part which requires software for particular applications -- business will likely go to those companies with good management and marketing backup. Indeed, an entirely new field is opening up. Companies such as Fordax (previously Infocom) and Data Processing International are designing special "transaction oriented systems" in which a special software package is designed for a particular industry, then "tuned" for individual users who get a minicomputer "thrown in" as a part of the total package.

What is a minicomputer, anyway?

In a sense, Mark Twain's comments about the New England weather seem quite appropriate when applied to the nature of definitions for the computer industry:

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> There is a sumptuous variety about the New England weather that compels the stranger's admiration -- and regret. The weather is always doing something there; always attending strictly to business; always getting up new designs and trying them on the people to see how they will go. But it gets through more business in spring than in any other season. In the spring I have counted one hundred and thirty-six different kinds of weather inside of four-and-twenty hours.

Perhaps the computer industry isn't subject to quite so much change! In any event, EDP/IR has a definition of "minicomputer" that has held up for at least a year, and at this point in time still seems appropriate. Machines in this class:

- Cost less than $25,000 in their smallest general-purpose configuration, which must include some type of input/output device such as a teleprinter or reader/punch for paper tape or cards.

- Provide at least 4,000 words of memory, with associated logic circuitry, and perform calculations under control of stored programs.

- Can be programmed in assembly level language, or some form of higher level language such as Fortran or Basic.

- Can be used by a fairly broad range of commercial, scientific, or industrial users rather than being restricted to specialized military or aerospace applications.

Essentially, then, the minicomputer is a small, low-priced, general-purpose computer that -- in most cases -- is purchased outright and used for a dedicated application. This dedication may be firm . . . as in the case of the minicomputers being used as components in an OCR system, a process control system, or some other type of electronic equipment that needs logical power for proper operation.

On the other hand, the dedication may be more elastic, as in a corporate research and development or university environment where one person uses the mini essentially as a desk-top calculator, the next person uses it as a small program development tool, and another uses it to carry out more complex calculations for a specialized project.

In the latter types of applications, the use of a mini is quite similar to that of the larger general-purpose computer. But there usually is a difference, in that the machine is in a captive environment, used by only one person at a time, and to a large extent not really considered to be a "computer." Indeed, it is in uses such as these that conversational time sharing is the greatest "threat" to the minicomputer, and often the orientation of a project manager or the like determines which direction a particular user is likely to take.

A changing market

The relative importance of the minicomputer in uses described above, however, has been declining virtually since DEC introduced the first minicomputer -- the PDP-8 -- in the spring of 1965. During this five-year period, the mini's use has changed dramatically. In the beginning, laboratory managers, individual scientists, and technicians were the major customer group; today, large industrial buyers -- machine tool companies, data terminal equipment makers, and producers of a wide variety of process automation and test equipment -- are providing the market, often on an OEM basis, for some 70% of the minis that are produced.

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This aspect of the marketplace definitely sets the minicomputer business off from the conventional EDP industry. For one thing, most OEM orders are outright sales, with individual orders usually measured in 50s and 100s rather than in ones and twos. This results in both advantages and disadvantages. On the plus side:

+ Large orders mean lower sales expense, and a small company has a chance to break into volume production with relatively little development cost.
+ Customers that "design-in" specific firmware into a minicomputer are committed over a fairly long time period.
+ Volume output lets the mini maker achieve lower costs through mass production techniques and longer manufacturing runs.

Also, there are potential problems for the small manufacturer with large OEM sales. These are similar to those of people who sell motors for washing machines:

- Buyers want end-product quality and reliability, with little if any need for repair and/or maintenance.
- Computers, unlike motors, must have software -- with development costs that exceed those of the hardware -- provided by the minicomputer manufacturer.
- There is considerable risk for the mini manufacturer who depends too heavily on one or two customers, since OEM customers sometimes change vendors or do not require projected volume levels.

Volume sales to the OEM market also mean volume discounts. For example Data General, an offshoot of Digital that started delivering its minicomputers about a year ago, offered discounts of up to 40% from the $7,000 list price . . . for lots of 200 or more. And quantity discounts in the 20% range are current practice.

The outlook

The potential minicomputer market is so broad that there is still very little head-to-head competition, and most of that is between Digital and some other company. A few manufacturers already have heavy industry concentration: Hewlett-Packard in instrumentation in the West, or Honeywell CCD in communications.

In general, therefore, the outlook for minicomputers is good, with shipments in number of units growing at the 40% to 50% rate for the next several years. During the current economic squeeze, however, some companies with shaky or completely technical management may fold or be absorbed, and fewer new ones should be formed. The trend in sales will continue in two directions -- to the OEM manufacturer and to the individual who expects specialized software packages.

Minis will play an increasing role in the Rair market. They will continue to be used as concentrators in large systems. There will likely be an increasing demand for specialized, minicomputer-based time-sharing systems which in the future could well be connected to large Rair systems for access to more computing power or connection to large data bases.

In summary, it seems to EDP/IR that the minicomputer industry will go in two directions, with some of the larger companies obviously following both: (1) The OEM market will continue to be important, with competition developing much as it has in the electronic component supply business; (2) the market for minis with specialized software -- even as broad as time sharing for small business -- will develop quite rapidly. And, as prices of electronic circuitry come down, there is no reason why the minicomputer won't soon be a luxury type consumer item. Next year, or the next, Neiman-Marcus may sell quite a few minis.

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DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

These counts for Dedicated Application General Purpose Computers (Group B) are based on the best information available to the International Data Corp., and much of the data has been verified by the manufacturers. (Any comments and/or corrections should be reported to Walter Misdom, EDP/IR's census editor.) Group B computers include "mini's" (purchase price below $25,000), "midi's" ($25,000 to $50,000), and certain larger systems usually designed or used for one dedicated application such as process control, data acquisition, etc. These computers are word oriented, usually purchased, and predominantly programmed in assembly language. Since this is the first such Census ever published, there are certain blank fields for which information was not available at press time; as a result, totals for U.S. and Outside U.S. installations will not add up to the grand total.

AS OF OCTOBER 1, 1969

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Adage	Ambilog-200	30		173	8/64				X
Autonetics	Recomp-II	40	95	127	11/58	20	5	25	X
	Recomp-III	40	65	94	6/61	7	2	9	X
Bailey Meter	756	25		200	11/65	25	0	25	5
	855	25		250	12/68	10	0	10	9
Beckman	420	18		98	6/64				X
	816		9.7	22.9					
Business Information Technology	480	8	9.7	16.2	12/66	98	0	98	150
	483	8	7.7	15.5	12/69	3	0	3	330
Bunker-Ramo	130	15		90	12/61	160	27	187	X
	133	15		180	6/64	64	9	73	X
	230	15		134	6/63	20	2	22	X
	300			275	1/60	18	5	23	X
	330	29		275	12/60	23	5	28	X
	340	29		375	10/63	19	3	22	X
	530	18		300	8/61	18	3	21	X
Computer Automation, Inc.	208	8	6	12.4	6/69	5	0	5	
	216	16	8	23	7/70	0	0	0	
	808	8	5	11	6/68	70			250
	816	16	9.9	23.6	12/68	35			
Compiler Systems		16	10.7		11/69	0	0	0	
Control Data Corp.	160	12	60	112	5/60	49	11	60	X
	160-A	12	90	225	7/61	200	65	265	X
	160-G	13		536	3/64	35	0	35	X
	924/A	24		430	8/61	26	1	27	X
	1700	16	43	170	5/66	243	61	304	68
	8090	12		96	5/64	116	89	205	X
	8092	8		67	6/64	60	0	60	X
	G-15	29		61	7/55	270	18	288	X
	LGP-21	32		42	12/62	145	13	158	X
	LGP-30	32	49.5	59	9/56	295	49	344	X
	RPC-4000	32	87.5	101	10/60	62	12	74	X
	CSC-46	21		250	/54	10	0	10	X
	CSC-136	25		275	/60	4	1	5	X
	CSC-636	15		300	10/63	13	2	15	X
Computer Logic	CLS-18	18	7.5		11/69	0	0	0	
Collins	8401			950	11/62	25	5	30	X
	8500	32		120	1/67	4	1	5	
Data Craft	6024-1	24	53.9	120	5/69				
	6024-3	24	28.8		/70	0	0	0	
Data General	Nova	16	7.9	16	2/69	180	20	200	500
	Super Nova	16	11.7		4/70				
Data Mate	DM-8	8	14.9	24	6/69				
	DM-16	16	14.9		10/69	0	0	0	
Digital Electronics	3080	25		18	12/64	11			X
	3080-C	25		31	10/67	1			
Data Technology	1600	(See CAI-808)							
Decade Computer	70	(See Redcor RC/70)							
Digital Equipment Corp.	PDP-1	18		136	11/60	50	2	52	X
	PDP-4	18		74	8/62	40	5	45	X
	PDP-5	12	30	36	9/63	90	10	100	X
	PDP-7	18		66	11/64	124	36	160	X
	PDP-8	12	18.5	24	5/65	1189	255	1444	X
	PDP-8/I	12	12.8	18	3/68	761	238	999	
	PDP-8/L	12	8.5	21.3	7/68	529	138	667	
	PDP-8/S	12	10	18	9/66	850	84	934	X
	PDP-9	18	35.0	62	12/66	262	115	377	18
	PDP-9/L	18	19.9	32.6	11/68	25	10	35	18
	PDP-12	12	3	18	4/69	20	4	24	
	PDP-15	18	16.5	55	1/70	0	0	0	200
	Linc-8	12	38.5	47.5	9/66	108	40	148	
Dynamic Research	DRC-44	24	35	51.1	12/68				
Electronic Associates, Inc.	640	16	26.5	75	6/67	80	32	112	8
EMR(ASI)	210	21	94	132	4/62	9	0	9	X
	420	42	324	450	6/63	3	0	3	X
	2100	21		143	12/63	8	0	8	X
	6020	24		176	4/65	17	0	17	X
	6D40	24		224	7/65	8	3	11	X
	6050	24		360	2/66	15	4	19	X
	6070	24		600	10/65	3	2	5	X
	6130	16		62	10/67	41	8	49	15
General Automation, Inc.	SPC-8	8	5	10	1/68	200			
	SPC-12	12	6.4	18	/69				
	GA-18/30	16	18		7/69				

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SPECIAL NEWS SUPPLEMENT

February 5, 1970

Preface to Vol.5 • No. 7

EDP industry report

EDP INDUSTRY REPORT AND MARKET REVIEW
60 AUSTIN STREET
NEWTONVILLE, MASSACHUSETTS
02160 □ 617-969-4020

The attached issue of EDP Industry Report was at the printer when there was a further development concerning the sale by LTV Aerospace Corp. to University Computing Company of stock and other securities that LTVAC held in Computer Technology Inc. On February 3, G.W. Woerner, Jr. -- former CT president, and still a director of CT -- sent the following telegram to other members of CT's board of directors:

IT IS NOW APPARENT THAT UCC, LTV, INC., AND LTV AEROSPACE CORP. HAVE CONSPIRED AND AGREED TO TAKE ACTIONS WHICH HAVE BEEN AND WILL CONTINUE TO BE VIOLATIVE OF THE ANTITRUST LAWS AND DETRIMENTAL TO THE MINORITY STOCKHOLDERS OF CT INC. IN ADDITION, ACTIONS TAKEN BY A MAJORITY OF THE BOARD OF DIRECTORS OF CT HAVE VIOLATED SUCH DIRECTORS' FIDUCIARY DUTY NOT TO DISSIPATE THE CORPORATE ASSETS OF CT, TO THE DETRIMENT OF MINORITY STOCKHOLDERS. THEREFORE, AS A SHAREHOLDER OF CT AND ON BEHALF OF ALL OTHER CT SHAREHOLDERS SIMILARLY SITUATED, THE UNDERSIGNED, G.W. WOERNER, JR., DEMANDS THAT YOU AND EACH OF YOU AS DIRECTORS OF CT WITHIN 15 DAYS AFTER RECEIPT OF THIS DEMAND:

1. TAKE IMMEDIATE ACTION TO NULLIFY THE ELECTIONS OF DOUGLASS M. PARNELL, SAM WYLY, CHARLES J. WYLY, JR., E.W. MCCAIN, JR. TO THE BOARD OF DIRECTORS OF CT;
2. TAKE IMMEDIATE ACTION TO REQUIRE UCC TO DIVEST ITSELF OF OWNERSHIP OF ALL SHARES AND OTHER REGISTERED SECURITIES OF CT PRESENTLY OWNED BY IT;
3. TAKE IMMEDIATE ACTION TO ENJOIN UCC FROM OBTAINING IN THE FUTURE ANY OWNERSHIP OF SHARES OR OTHER SECURITIES OF CT AND TO ENJOIN LTV AND LTVA FROM TRANSFERRING SHARES OR OTHER SECURITIES TO UCC AT ANY TIME;
4. TAKE IMMEDIATE ACTION AGAINST UCC, LTV, AND LTVA TO RECOVER DAMAGES SUFFERED BY CT AS A CONSEQUENCE OF THEIR VIOLATION OF THE ANTITRUST LAWS;
5. TAKE IMMEDIATE ACTION AGAINST THOSE MEMBERS OF THE BOARD OF DIRECTORS WHO APPROVED OR AUTHORIZED ANY TRANSACTION WITH UCC, LTV, AND LTVA IN VIOLATION OF THEIR FIDUCIARY DUTY;
6. TAKE IMMEDIATE ACTION TO RECOVER DAMAGES FROM LTV, LTVA, AND UCC FOR VIOLATION OF THEIR FIDUCIARY DUTIES AS MAJORITY OR CONTROLLING SHAREHOLDERS OF CT.

THE UNDERSIGNED FURTHER DEMANDS THAT SUCH ACTION TAKEN AGAINST UCC, LTV, AND LTVA OUGHT TO BE TAKEN AGAINST THEIR RESPECTIVE DIRECTORS, OFFICERS, AGENTS, EMPLOYEES, AND ANY OTHER PERSONS WHO ACTED IN CONCERT WITH THEM INCLUDING BUT NOT LIMITED TO JAMES J. LING, W. PAUL THAYER, DOUGLASS M. PARNELL, SAM WYLY, CHARLES J. WYLY, JR., C.W. MCCAIN, JR.

G.W. Woerner, Jr.
Director and Shareholder of CT

After word of this telegram was published in the Wall Street Journal on Feb. 4, the companies involved began to prepare replies for the press. By the end of the working day, a spokesman for CT issued his company's statement:

> We take issue with the facts and legal conclusions set forth in the telegram and if a lawsuit were to be filed, it would be defended vigorously.

The statement from UCC was similar:

> There is no legal or factual basis for these assertions and if litigation of any kind should be initiated it will be wholeheartedly contested in court.

AS OF OCTOBER 1, 1969

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
General Electric	30-1		11.8			0	0	0	
Co., GE/PAC	30-2		5			0	0	0	
	312	20		200	3/60	27	6	33	X
	412	20		300	7/62	39	8	47	X
	4020	24		200	2/67	113	38	151	53
	4040	24		120	8/64	45	20	65	X
	4050	24		280	12/66	22	1	23	X
	4060	24		340	6/65	18	2	20	X
	Datanet-30	18		165	10/63				
GRI	909	16	6.5	11.3	10/69	0	0	0	
Hewlett-Packard	2000-A			100	11/68	36	2	38	46
	2005-A			76	7/69	3	0	3	5
	2114-A	16	10.4	16	10/68			129	172
	2115-A	16	15.2	26.6	11/67			227	19
	2116-A	16		24	11/66	77	16	93	X
	2116-B	16	25	33	9/68			237	66
Honeywell,CCD	116	16		65	4/65	148	34	182	X
	316	16	9.7	28	6/69	12	0	12	
	416	16	15.7	48	12/68	105	23	128	
	516	16	23.8	90	6/66	312	88	400	140
	19	19		140	5/61	3	0	3	X
	24	24		200	5/63	67	7	74	X
	124	24		158	3/66	69	29	98	6
	224	24		380	3/65	40	8	48	X
	290	18		175	11/60	10	2	12	X
	610/620	24		180	8/63	22	6	28	X
	H-21	20		63	2/66	41	25	66	X
IBM	1710/20	6		227	2/62	87	37	124	X
	1800	18		235	2/66	685	245	930	230
	7700	18		300	3/64	3	0	3	X
Information Technology	4900/20	16	9.9						
Interdata, Inc.	2	8	8.9	11	7/68	12	0	12	X
	3	16	9.3	20	5/67	170	0	170	40
	4	16	12.3	28	8/68	90	3	93	50
	15	16	17.3	40	1/69	40	0	40	10
IRA	Spiras-65	16	14.9	24	8/69				
Lockheed Electronics Co.	MAC-16	16	11.9	21.6	3/69	65	5	70	200
Micro Systems	800	8	3.2	12	1/69				}
	810	8	6.9		1/69				} 165
	812	9	10		12/69	0	0	0	}
Motorola Instrumentation	MDP-1000	8	6.9	18.9	6/68				
Mini Comp	Multi Term.	16	42.9	89	9/70	0	0	0	0
PDS	1020	16		25	2/64	100	27	127	X
Philco, WDL	1212	12	7.5						
	1216	16							
	1220	20							
	102 (CPS)	32	128	280	11/65				X
Raytheon Computer	PB-250	22	31	48	12/60	108	26	134	X
	PB-440	24		140	3/64	16	2	18	X
	PB-520	24		128	10/65	22	3	25	X
	703	16	12.7	20	10/67	105	26	131	5
	704	16	9.9			0	0	0	
	706	16	19.0	36	5/69	3	1	4	30
Redcor Corp.	RC-70	16	12.9	29.4	7/68	40	0	40	
	RC-77			111	1/70	0	0	0	
Rolm Corp.	1601	16		20					
Sanders	200	16		72	3/69				
Scientific Control Corp.	650	12	14.8	20	5/66	23	0	23	X
	655		15.9	84	10/66	111	0	111	25
	660	24		84	10/65	27	0	27	12
	670	24		108	5/66	1	0	1	X
	4700	16	16.2	72	4/69	13	0	13	79
	DCT-32			12	11/69	0	0	0	3
	DCT-132			29	5/69	23	0	23	509
Spear Systems	Microlinc			56.5					
Engineering Labs., Inc.	810	16		40	9/65	22	2	24	X
	810-A	16	18	36	8/66	141	11	152	}
	810-B	16	33.5	48	12/68	86	0	86	} 56
	840	24		56	11/65	3	0	3	X
	840-A	24		56	8/66	33	0	33	}
	840-MP	24		64	10/67	35	0	35	} 15
	86		8.3		1/70	0	0	0	
	88		20		1/70	0	0	0	
Tempo	1	16	13.8		9/69	2	0	2	
	1-A	16	24	29.6					
Transistor Electronics	TEC-520		13.8						
Unicomp	Comp-16	16	9.8			0	0	0	
	Comp-18	18				0	0	0	
Varian Data Machines	520i	8/16	7.5	12.8	9/68	50			
	610	12		14.7	7/64	10			X
	611/612	12			9/65				X
	620	16		37	11/65	75			X
	620i	16	9.9	37	7/67	255			750
	622i	18	12						
Viatron	2140	16	47.5		4/70	0	0	0	
	2150	16	94.5		4/70	0	0	0	
Westinghouse Electric Corp.	50	14		23.3	8/64				X
	250 (S-2)	16		62	9/67				
Prodac	510/580	18		110	6/63				X
	2000	16	10	26.6	8/69				
Xerox Data Systems	92	12		60	4/65	60	5	65	X
	910	24		80	8/62	168	15	183	X
	920	24		116	9/62	135	19	154	X
	925	24		120	12/64	20	2	22	X
	930	24		136	6/64	140	19	159	X
	Sigma-2	16		84	12/66	191	39	230	110
	Sigma-3	16	30	104	12/69	0	0	0	
	CE-16	16	12.8	17.4	6/69				
	CF-16	16	14.9	25	9/69				
	TOTALS (See Introductory Paragraph)					11,155	2,197	13,238	

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December 15, 1969 - January 2, 1970

	1969-1970 High	1969-1970 Low	3 week Sales in 100's	3 week High	3 week Low	Last	3 week Net Change	3 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	85	59	1406	65 1/2	59	60 1/4	- 5 5/8	- 9.3
American R & D	89 1/4	44	1682	85 1/2	78 1/2	83 1/2	+ 1 1/2	+ 1.8
Ampex Corp.	49 7/8	32 1/2	1290	47 3/4	43 1/4	47 5/8	+ 2 5/8	+ 5.5
Bunker Ramo	17 5/8	9 1/2	3271	14 7/8	13 3/8	14 1/4	+ 1/4	+ 1.8
Burroughs	167 1/2	120 3/4	2222	164 7/8	154 1/4	158 3/4	- 2 1/4	- 1.4
Collins Radio	69 3/4	33	1261	38 1/2	33	36 3/8	- 1 7/8	- 5.2
Computer Sciences	34 3/4	19 1/2	5115	34 1/8	30	34	+ 2 7/8	+ 8.5
Control Data	159 1/4	110	3973	119 1/4	114 1/2	119 1/4	+ 2	+ 1.7
Electronic Assoc.	25 1/4	9 3/4	1553	12	9 3/4	10 5/8	- 1 1/8	-10.6
General Electric	98 1/4	74 1/8	5386	78 3/4	74 1/8	76 5/8	- 2	- 2.6
Honeywell	157 1/4	107 3/4	1428	149	138 1/2	143 1/2	- 4 1/2	- 3.1
IBM	368 3/4	291 3/4	3333	367	350 1/4	364 3/4	+ 5 1/4	+ 1.4
ITT	60 1/2	46 1/4	8151	59 7/8	56 1/2	59 7/8	+ 4 3/4	+ 7.9
Leasco	54	22 1/2	5942	30 3/4	24	29 1/2	+ 5 1/4	+17.8
Litton	74 1/2	35	7942	37 3/4	35	36 1/2	- 2	- 5.5
Memorex	173 7/8	65	3536	164 3/8	148	148	-14 1/8	- 9.5
National Cash Register	162 3/4	108	2722	162 3/4	147 3/4	160 1/2	+11 3/4	+ 7.3
Planning Research	50 3/8	23 7/8	1136	50 3/8	46 1/8	47 1/2	+ 1 1/4	+ 2.6
RCA	48 1/8	33 3/4	5599	36 5/8	33 3/4	34 1/2	- 1 1/2	- 4.3
Raytheon	50 1/4	30 5/8	2219	33 3/4	31	33 1/4	- 1/4	- 0.8
SCM	47 1/8	21 7/8	3550	24 1/2	21 7/8	24 1/2	+ 1 1/2	+ 6.1
Sanders	61 7/8	22	1831	27 1/4	23 3/8	26 7/8	+ 1 7/8	+ 7.0
Sangamo	43 1/2	19 1/4	1332	26 5/8	22 1/8	26 1/8	+ 1 1/2	+ 5.7
Singer	87 7/8	62	1574	85 1/2	80 1/4	84 3/4	+ 1 5/8	+ 1.9
Sperry Rand	55 1/2	36 1/8	7069	38 3/8	36 1/8	37 1/4	- 3/4	- 2.0
Teledyne	45 1/2	28 1/4	4419	40 1/4	34 3/8	39 3/4	+ 4 3/8	+11.0
University Computing	111 1/2	64 1/4	3863	107 3/8	95 1/2	96 7/8	- 8 5/8	- 8.9
Xerox	115	85 1/4	6665	105 7/8	101	104 1/2	- 2 5/8	- 2.5
NYSE COMPUTER STOCK AVERAGE							+ 0.4	+ 0.8
AMERICAN STOCK EXCHANGE								
Applied Data Research	32 7/8	19	437	26	23 1/8	23 1/2	- 1/4	- 1.1
Automatic D P	43 1/2	21	2379	43 1/2	35 1/8	42 7/8	+ 7	+16.3
Calcomp	37 1/2	18 1/4	1015	29	25 1/2	27 3/4	+ 1 3/8	+ 5.0
Clary Corp.	25 3/4	7 7/8	620	9 7/8	7 7/8	9 3/4	+ 1/4	+ 2.6
Computer Applications	21 7/8	9 1/2	579	11 1/2	10 1/8	11 3/8	+ 3/4	+ 6.6
Computing and Software	72 3/4	37	787	67 1/4	61 3/4	65 1/2	+ 1 7/8	+ 2.9
DPA, Inc.	13 5/8	8 1/8	1044	10	8 7/8	9 7/8	+ 1/4	+ 2.5
Data Proc. Fin. & Gen.	60 1/4	23 5/8	1638	32	28 1/2	31 1/8	+ 1/8	+ 0.4
Data Products	27 7/8	12 3/8	5175	25 1/2	21 3/8	24	+ 1 1/4	+ 5.2
Digital Equipment	104 7/8	54 1/2	1390	104 7/8	89 1/4	104 7/8	+11 1/8	+10.6
Granite Mgt.	45 1/2	16 3/4	821	22 7/8	18 7/8	22	- 1/4	- 1.1
Greyhound Computer	28 5/8	12	985	14	12	13 1/2	--	--
ITEL	37 5/8	14 1/4	5527	37 5/8	22 1/4	23 1/8	-13 7/8	-60.0
Levin-Townsend Comp.	57 1/2	16 1/2	2310	19 3/4	16 1/2	18 3/4	- 3/4	- 4.0
Milgo Elect.	75 1/4	17 7/8	4468	75 1/4	66	67 3/8	- 7/8	- 1.3
Mohawk Data Sciences	89 1/8	59 3/4	2202	74 3/4	68	73 1/4	+ 1 3/4	+ 2.4
Potter Instrument	46	23 3/4	1292	39 3/4	33 3/4	37 5/8	+ 1 7/8	+ 5.0
Sys. Eng. Labs.	53 7/8	26 1/8	2795	52 1/2	45 5/8	47 5/8	- 3 1/8	- 6.6
Telex	111 3/4	20 3/4	5501	109	90	92 1/2	-16	-17.3
AMSE COMPUTER STOCK AVERAGE							- 0.4	- 0.2

OVER-THE-COUNTER	1969-1970 High Bid	1969-1970 Low Bid	January 2, Bid	January 2, Asked	3 weeks ago Bid	3 week net change Bid	3 week % change Bid
Aries Corp.	19	6	8	8 1/2	6 1/4	+ 1 3/4	+21.9
Bolt, Beranek & Newman, Inc.	19	7 1/2	10	11	13 1/4	- 3 1/4	-37.5
Computer Usage	40	7	7 3/4	8 1/2	11 1/2	- 3 3/4	-48.4
Cyber-tronics	13 1/8	7	12 1/2	13	10	+ 2 1/2	+20.0
Digitronics	22 1/2	13 1/2	13 3/4	14 3/4	14 3/4	- 1	- 7.3
Fabri-Tek	12 7/8	5 5/8	6	6 1/2	6	--	--
Informatics, Inc.	30 1/4	11 3/4	20 3/4	21 1/2	16 1/2	+ 4 1/4	+20.5
LMC Data, Inc.	8 1/4	1 3/4	1 7/8	2 3/8	2 5/8	- 3/4	-40.0
Management Assistance	14 7/8	2 1/8	2 7/8	3 1/8	2 5/8	+ 1/4	+ 8.7
Optical Scanning Corp.	118	41	52	55	52	--	--
Recognition Equipment, Inc.	76	52	74 1/2	75 1/2	72	+ 2 1/2	+ 3.4
TBS Computer Centers Corp.	36	11	19 1/2	20 1/2	19	+ 1/2	+ 2.6
Tally Corp.	36	15	17 1/2	19	17	+ 1/2	+ 2.9

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SPECIAL NEWS SUPPLEMENT

February 5, 1970

Preface to Vol.5 • No. 7

EDP industry report

EDP INDUSTRY REPORT AND MARKET REVIEW
60 AUSTIN STREET
NEWTONVILLE, MASSACHUSETTS
02160 □ 617-969-4020

The attached issue of EDP Industry Report was at the printer when there was a further development concerning the sale by LTV Aerospace Corp. to University Computing Company of stock and other securities that LTVAC held in Computer Technology Inc. On February 3, G.W. Woerner, Jr. -- former CT president, and still a director of CT -- sent the following telegram to other members of CT's board of directors:

IT IS NOW APPARENT THAT UCC, LTV, INC., AND LTV AEROSPACE CORP. HAVE CONSPIRED AND AGREED TO TAKE ACTIONS WHICH HAVE BEEN AND WILL CONTINUE TO BE VIOLATIVE OF THE ANTITRUST LAWS AND DETRIMENTAL TO THE MINORITY STOCKHOLDERS OF CT INC. IN ADDITION, ACTIONS TAKEN BY A MAJORITY OF THE BOARD OF DIRECTORS OF CT HAVE VIOLATED SUCH DIRECTORS' FIDUCIARY DUTY NOT TO DISSIPATE THE CORPORATE ASSETS OF CT, TO THE DETRIMENT OF MINORITY STOCKHOLDERS. THEREFORE, AS A SHAREHOLDER OF CT AND ON BEHALF OF ALL OTHER CT SHAREHOLDERS SIMILARLY SITUATED, THE UNDERSIGNED, G.W. WOERNER, JR., DEMANDS THAT YOU AND EACH OF YOU AS DIRECTORS OF CT WITHIN 15 DAYS AFTER RECEIPT OF THIS DEMAND:

1. TAKE IMMEDIATE ACTION TO NULLIFY THE ELECTIONS OF DOUGLASS M. PARNELL, SAM WYLY, CHARLES J. WYLY, JR., E.W. MCCAIN, JR. TO THE BOARD OF DIRECTORS OF CT;
2. TAKE IMMEDIATE ACTION TO REQUIRE UCC TO DIVEST ITSELF OF OWNERSHIP OF ALL SHARES AND OTHER REGISTERED SECURITIES OF CT PRESENTLY OWNED BY IT;
3. TAKE IMMEDIATE ACTION TO ENJOIN UCC FROM OBTAINING IN THE FUTURE ANY OWNERSHIP OF SHARES OR OTHER SECURITIES OF CT AND TO ENJOIN LTV AND LTVA FROM TRANSFERRING SHARES OR OTHER SECURITIES TO UCC AT ANY TIME;
4. TAKE IMMEDIATE ACTION AGAINST UCC, LTV, AND LTVA TO RECOVER DAMAGES SUFFERED BY CT AS A CONSEQUENCE OF THEIR VIOLATION OF THE ANTITRUST LAWS;
5. TAKE IMMEDIATE ACTION AGAINST THOSE MEMBERS OF THE BOARD OF DIRECTORS WHO APPROVED OR AUTHORIZED ANY TRANSACTION WITH UCC, LTV, AND LTVA IN VIOLATION OF THEIR FIDUCIARY DUTY;
6. TAKE IMMEDIATE ACTION TO RECOVER DAMAGES FROM LTV, LTVA, AND UCC FOR VIOLATION OF THEIR FIDUCIARY DUTIES AS MAJORITY OR CONTROLLING SHAREHOLDERS OF CT.

THE UNDERSIGNED FURTHER DEMANDS THAT SUCH ACTION TAKEN AGAINST UCC, LTV, AND LTVA OUGHT TO BE TAKEN AGAINST THEIR RESPECTIVE DIRECTORS, OFFICERS, AGENTS, EMPLOYEES, AND ANY OTHER PERSONS WHO ACTED IN CONCERT WITH THEM INCLUDING BUT NOT LIMITED TO JAMES J. LING, W. PAUL THAYER, DOUGLASS M. PARNELL, SAM WYLY, CHARLES J. WYLY, JR., C.W. MCCAIN, JR.

G.W. Woerner, Jr.
Director and Shareholder of CT

After word of this telegram was published in the Wall Street Journal on Feb. 4, the companies involved began to prepare replies for the press. By the end of the working day, a spokesman for CT issued his company's statement:

> We take issue with the facts and legal conclusions set forth in the telegram and if a lawsuit were to be filed, it would be defended vigorously.

The statement from UCC was similar:

> There is no legal or factual basis for these assertions and if litigation of any kind should be initiated it will be wholeheartedly contested in court.

EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" [redacted] 1970 • VOL.5,NO.7 P.J.McGOVERN,EDITOR

THE TEXAS "POKER GAME" INVOLVING CT MAY SEEM COMPLEX, BUT NET RESULTS APPEAR TO BRING UCC NEARER ITS ANNOUNCED TECHNICAL GOAL

"It would all probably be quite simple," a computer industry observer recently told EDP Industry Report, "if you were sitting right there at the card table."

+ The action he described is the fast-paced, poker-like succession of company buying and swapping that keeps coming from the Dallas newswire.

+ The players are on two teams . . . one headed by the Wyly's (Sam and Charles) of University Computing Company, the other by James J. Ling of Ling-Temco-Vought.

+ The biggest chip in the pot is Computer Technology Inc., spawned about a year-and-a-half ago by LTV Aerospace Inc. (a Ling-Temco-Vought subsidiary), which until this year owned 71% of the facilities management company.

At the present, UCC essentially has control of CT, which has transferred its corporate headquarters from the Chicago area to Dallas, home of UCC as well as of LTVAC. In addition, University Computing has been busy on several other fronts. Because of this, investors apparently are confused or disappointed: As this issue of EDP/IR went to press, UCC's stock was trading in the low 60s, having recently hit the lowest point (59 1/2) since it was listed on the NYSE last September. Here's what the Texas compuglomerate has been up to:

- On January 7, UCC acquired a 35.5% stock interest (half of LTVAC's holdings) in Computer Technology "as part of a complex exchange agreement" that cost UCC $20 million. . . plus. One of the additional features gives UCC rights to all outstanding CT warrants which, when exercised, would mean that UCC owned 49% of CT.

- Through an exchange of stock, UCC brought its two majority-owned subsidiaries -- Computer Leasing Co. and Computer Industries, Inc. -- back "into the fold" as wholly owned subsidiaries, thus allowing closer integration of UCC's leasing and manufacturing activities.

- For a new Government Systems Division, UCC has announced that it will buy, from Univac, over $36 million worth of computers that, with associated communications subsystems, are used in two Government networks and that had "aggregate annual rentals under GSA terms" of about $17 million. In the same announcement, UCC reported increasing the principal amount of recently registered 25-year convertible subordinated debentures from $40 million to $60 million and for the private sale, to institutions, of 159,000 shares of common stock.

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[Of this stock, 154,000 shares have been sold -- at $80 a share -- to institutions. (One group with an order for 5,000 shares pulled out.) The deal, according to people involved, was negotiated at a time when the price for UCC stock was in the 100 range. It illustrates what can happen in private negotiations of this type. In many such situations, however, the effect is in the opposite direction, and an agreement negotiated at, say, 50 per share looks very good when the stock is selling in the 100 area at the time of settlement.]

The debenture placement has been postponed because of "general market conditions" and because prospective buyers want to wait until the 1969 financial reports are announced. No preliminary reports are available, but the company says that 1969 results will be in line with earlier forecasts. The debentures should be out by middle or late February, with part of the proceeds earmarked for the purchases from Univac.

Quick overview

Details of the financial maneuvering aside, UCC's course of action sounds quite reasonable to EDP/IR: Raise some capital by selling stock and debentures; purchase computers, used in two large networks, that will be leased back to the Federal Government and could use equipment built by a now-consolidated manufacturing subsidiary; purchase virtual control of a leading facilities management company described by Sam Wyly as "compatible" with UCC's computer utility network and other resources.

Already, however, there has been a move in the game that doesn't quite seem to fit in. Part of UCC's purchase agreement for its share of CT was a provision that CT would have the right "within six months to require LTV Aerospace [LTVAC] to repurchase Service Technology Corp., a wholly owned subsidiary of CT, at a book value price not to exceed $2.5 million." STC manages computer installations for NASA, including an $89 million computer complex at the Houston Manned Space Flight Center. The repurchase was carried out on Jan. 26.

One of the major reasons for this is that "Service Technology contributed 56% to CT's 1969 first nine months' gross revenues but only 23% to earnings. Aside from its limited contribution to CT's profitability," says CT's new president, Douglass M. Parnell, Jr., "we decided that Service Technology's emphasis on electronics engineering and other services for Federal agencies is not directly compatible with CT's primary goal of providing total facilities management services for industrial and commercial computer users."

At this time, with UCC barging so heavily into the Government systems area, such a move seems strange to EDP/IR. But, then, we aren't sitting at the card table. During the remainder of this report, we will present the details announced so far in the "complex exchange" and give our analysis when appropriate. Perhaps we can make the picture simpler, if not "quite simple."

Details of the "complex exchange agreement"

University Computing's giant step toward control of Computer Technology -- LTVAC's facilities management and computer services subsidiary -- is part of a complex swapping of stocks, debentures, subsidiaries, and contracts between the two Texas conglomerates. The $20 million that UCC pays LTVAC is only one element in the transaction. Other features -- that make this the "complex exchange" -- include the following:

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- UCC receives two million shares of CT common, all outstanding warrants to purchase CT common stock (representing another million and a half shares), and a $2.5 million CT debenture.

- During the next three years, CT and LTVAC jointly will pay UCC nearly $5 million a year for management services.

- In addition to the $20 million in cash, LTVAC gets UCC's ownership in the Academy of Computer Technology, Inc., an unconsolidated subsidiary, and Alcorn Combustion Co., Inc., a UCC subsidiary which showed a loss for the first nine months of 1969. Also, as mentioned above, LTVAC is buying back Service Technology Corp.

- LTVAC and UCC have split between them six of the seven positions on a new CT board of directors. Three LTV executives remain as directors, and three UCC officials -- including chairman Sam Wyly -- obtained seats through elections on January 7. The seventh director is CT President Parnell, a UCC nominee who previously had served as vice president of the National Bank of Detroit.

CT's goal: To become a "Third Force" in the computer industry

During August of 1968, Computer Technology was formed when LTV and its subsidiary LTVAC pooled most of their computer center activities to form the nucleus of what was to become a "Third Force" in the computer industry. CT, as such, became one of the major companies in the evolving field of facilities management. This concept -- established even before IBM had announced unbundling -- is to give the computer user a single supplier who can cut through the forest of data processing products and services.

In some instances, the facilities management company simply takes over a client's computer facility, contracts to accomplish specific jobs for a certain price, and does just this. Often, companies that take this approach to offering facilities management will specialize in certain industries and use centrally developed software packages for a number of clients.

Another approach -- and the one taken by Computer Technology -- is for the facilities management company to contract to take care of the client's needs, but to remove most of the computing to a central location away from the user's site. Typically, CT or a company operating as it does will take over the data processing operation of a client and guarantee specified results over a fixed period at a fixed price. Then, it will replace the client's present computer -- say a 360/30 or 360/40 -- with one that essentially is a terminal -- perhaps a 360/20. Additional terminals, such as teletypewriters, are added, and all equipment at the client's site is connected over communications links with a central, powerful computer complex where the data processing needs of many clients are actually taken care of. Almost all programming, therefore, can be done by a centralized staff.

Proceeding in the latter fashion, CT has not only performed work for LTV operations; it also has been aggressively seeking general business customers. The one-and-a-half year old company has busily staffed sales offices in various parts of the country, and is setting up central computing centers which usually are composed of an IBM 360/75 and two 360/65s. It claims satisfactory progress in lining up business outside the LTV family, despite a UCC spokesman's euphenistic statement that CT's new concept "is in advance of total market acceptance."

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Why would UCC want CT?

In prepared press releases, motives for action are seldom spelled out; similarly, company spokesmen are trained to fence gracefully when asked about this directly. In any event, it is obvious from recent actions that CT was considered a prime target for acquisition; also, there were overtones that LTV would be willing to let CT go to an appropriate bidder at an appropriate bid. Last fall, the Prudential Insurance Company toyed with the idea of taking over CT to run its many regional computer centers, perhaps as centers for expanded facilities management operational centers. But negotiations broke off in November.

Apparently, the new set of Texas-based negotiations began at that point, with the results as outlined above. The question, then, is: Why did UCC take up where the Prudential left off?

- Purely for investment purposes. CT is a rapidly growing company in the newest "glamor" sector of the computer industry -- facilities management. In addition, it has a secure income base as a result of a ten-year management contract with LTVAC.

- To gain expertise with IBM equipment, and marketing depth. CT is staffed with many ex-IBMers -- heavy in marketing orientation -- and manages primarily IBM hardware. UCC, on the other hand, has based its computer utility network primarily on Univac computers, and its service bureau and professional operations on a mixture of equipment that is heavy on Honeywell and includes virtually nothing built by IBM.

- To fill out its line of services. CT's facilities management services indeed complement UCC's line of computer utility, software, and professional services. In fact, considering the approach CT has for providing facilities management, the relationship with UCC eventually could lead to a promising combination of services via the same communications links.

Computer Technology definitely considers the last point to be a distinct possibility. A spokesman for CT says that it may use computers in the UCC network to provide its facilities management services in areas where CT has no computer centers. Also, it will lease some portion of its equipment from UCC rather than from the manufacturer or outside third-party lessors.

Another piece in the jigsaw puzzle

UCC's agreement over Computer Technology became effective not long after UCC had finished bringing its manufacturing and leasing subsidiaries back under total corporate control (see above). A major reason for UCC's action was to gain customers for its software and computer utility services from among CLC lessees and users of the Computer Industries graphics equipment and IBM-compatible Datel terminals. (The Cope series of high-speed terminals and communications controllers, also manufactured by Computer Industries, are already used within UCC's computer utility network.)

Ever since its formation, University has gone forward with a policy of diversification, often by acquisition, in an attempt to put together a true compuglomerate. The edging of CT into the UCC family adds facilities management capabilities to the jigsaw puzzle under construction -- the "multi-national computer utility."

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Another potential element in the overall picture could well be the Datran network (EDP/IR Dec.31,1969). This microwave network for public data transmission could tie together many links of UCC as well, if FCC approval is forthcoming. These other products and services available from UCC are:

- Computer utility services via a thirteen-city network.
- High- and low-speed computer terminals and other communications and peripheral devices.
- Computer leasing activities.
- Field engineering and maintenance for its own and other manufacturers' equipment.
- Many proprietary software packages and services.

About the only thing that would seem to be missing is the central processor itself. And UCC is looking in this direction. If all goes well, it expects to have a computer, built by an outside electronics manufacturer to UCC specs and carrying the UCC nameplate, by 1973 or 1974.

Another approach to being the "compleat" compuglomerate

In a real sense, University Computing started by filling a few obvious interstices in the computer marketplace and rapidly -- via many moves that might be considered "backward integration" -- seems about to emerge as a "compleat" compuglomerate . . . a conglomerate that concentrates on the total computer or information processing marketplace. Along the way, it picked up what could be considered its "bank" -- Gulf Insurance Co. About the only missing element -- which may be coming along soon -- is a large mainframe itself and perhaps some additional capability in the peripheral area.

All in all, however, it seems to EDP/IR that University Computing has put together virtually all the elements necessary to long-range survival and success in the information processing industry. It seems to have decided that if you can sell a customer one component of a data processing system, you quite well might be able to sell him everything . . . including relief from the problems of operating his own installation. Even if the Texas compuglomerate never produces the mainframe itself, it soon may have to be considered one of those "other" computer companies in the marketplace.

U.S. COMPANIES TAKE INCREASED AIM AT BOOMING EUROPEAN COMPUTER MARKET;
A VARIETY OF TECHNIQUES BEING EXPLORED FOR MARKET ENTRY

Last year, the value of computer shipments in Western Europe may have been as high as $2.5 million, according to initial reports in EDP Europa Report, a sister newsletter to EDP Industry Report and also published by the International Data Corporation. Figures recently published in the London-based EDP/ER show that the growth rate for European shipments approached 40% in 1969, and that a majority of European computers are of U.S. origin, although many of them are actually manufactured in Europe.

During the last month or so -- apparently realizing the European potential -- several U.S. computer service and peripheral suppliers have announced moves into the European marketplace . . . and the approaches they have taken indicate that there's more than one way to break into a market. Techniques reported range from licensing European producers to actually setting up complete manufacturing, sales, and service subsidiaries.

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ıbsidiaries, licensees . . .

- Potter Instruments, a leading peripherals manufacturer, will locate a subsidiary in Vienna. Initially, the new company will manufacture magnetic tape transports; eventually, Potter expects the subsidiary to offer its complete product line.

- Caelus Memories, a subsidiary of Electronic Memories and Magnetics, Inc., will manufacture and sell disk packs through a Belgium subsidiary. Sales offices or distributors will handle the line in France, Germany, England, and Italy.

- And in a reverse twist, Badische Anilin & Soda Fabrik (BASF), the German company which supplies tapes and disk packs from its U.S. subsidiary, BASF Systems Inc. (formerly Computron), has been licensed to manufacture and market Calcomp's Century Data product line. The U.S. plotting equipment manufacturer has agreed to transfer technology and manufacturing rights in return for a fee from BASF.

And joint ventures

Taking a still different approach for breaking into the foreign computer marketplace, Corporation S, an affiliate of Recognition Equipment, Inc., has formed a joint-venture corporation with a bank holding company from the United Kingdom. This new corporation will provide optical input services using a large-scale OCR system at an "optical input automation (Optimation) center" in Britain. Corporation S has also formed a subsidiary, Corporation S International, as a base for further penetration of European markets for its OCR services.

Similarly, Tymshare, Inc. has collaborated with a French management consulting company and a French bank to launch a joint venture. The new enterprise, CEGOS-Tymshare, will provide time-sharing services throughout Western Europe, according to Tymshare.

TIME-SHARING TIDBITS AND OTHER "RAIR" NEWS

There's been talk, recently, about a "shake-out" in time sharing. Actually, what is behind this is a marketplace realization that pure computational time-sharing, in many cases, is unprofitable, and that the future lies in Rair (Remote Access/Immediate Access) computing, as EDP/IR has pointed out in several past issues. Here is a summary of three recent announcements in this area:

Computer Sciences Corp.'s "Infonet" services for commercial, scientific, and government users (EDP/IR Feb.19,1969) is now open for business in four cities. Eventually, CSC plans to have a Rair network that includes twenty $3 million Univac 1108 computers to "fulfill the needs of every type client, from small time-sharing novices to big users supplementing their existing capabilities."

Applied Logic Corp., admitting some losses already, says it plans to secure a "leading position in national time sharing." Because of the substantial capital necessary to reach this position, it expects more losses in the near future.

Beneficial Finance Co. plans to link two 360/65s to nearly 1700 loan offices. Remote terminals will be used for message transmission as well as preparing loan contracts, posting monthly payments, and performing calculations.

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DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

January 5, - January 16, 1970

	1969-1970 High	1969-1970 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	85	55 1/2	888	62	55 1/2	55 1/2	- 4 3/4	- 7.9
American R & D	99 1/2	44	1805	99 1/2	84 1/2	93 1/2	+10	+12.0
Ampex Corp.	49 7/8	32 1/2	1050	48 1/2	44 3/8	44 5/8	- 3	- 6.3
Bunker Ramo	17 5/8	9 1/2	1727	14 3/8	13	13 1/8	- 1 1/8	- 7.9
Burroughs	172 3/4	120 3/4	1683	172 3/4	157 3/4	164 1/8	+ 5 3/8	+ 3.4
Collins Radio	69 3/4	30 1/4	431	37 1/4	30 1/4	30 5/8	- 5 3/4	-15.8
Computer Sciences	34 3/4	19 1/2	3127	33 7/8	30 3/8	31	+ 3	+ 8.8
Control Data	159 1/4	98	4932	122 1/2	98	98 3/4	-20 1/2	-17.2
Electronic Assoc.	25 1/4	9 3/4	863	11 5/8	10 1/8	10 1/8	- 1/2	- 4.7
General Electric	98 1/4	72 3/8	4765	77	72 3/8	74 3/8	- 2 1/4	- 2.9
Honeywell	157 1/4	107 3/4	1558	152	140 5/8	145 1/2	+ 2	+ 1.4
IBM	387	291 3/4	2943	387	366	369 3/4	+ 5	+ 1.4
ITT	60 1/2	46 1/4	3956	60 1/8	57 3/4	57 7/8	- 2	- 3.3
Leasco	54	22 1/2	5791	30 1/2	24 1/4	24 3/4	- 4 3/4	-16.1
Litton	74 1/2	29	13,682	38	27	30 5/8	- 5 7/8	-16.0
Memorex	173 7/8	65	2598	166 3/4	143	160 1/4	+12 1/4	+ 8.3
National Cash Register	171 3/4	108	2722	171 3/4	156 1/4	166	+ 5 1/2	+ 3.4
Planning Research	53 1/4	23 7/8	1141	53 1/4	45 3/4	49 3/4	+ 2 1/4	+ 4.7
RCA	48 1/8	31 1/2	5572	34 5/8	31 1/2	31 7/8	- 2 5/8	- 7.6
Raytheon	50 1/4	27 3/4	1380	33 5/8	27 3/4	28 1/4	- 5	-15.0
SCM	47 1/8	21 7/8	896	24 3/4	22 3/8	22 5/8	- 1 7/8	- 7.7
Sanders	61 7/8	22	1465	29 7/8	25	25	- 1 7/8	- 7.0
Sangamo	43 1/2	19 1/4	283	25 7/8	22 5/8	22 5/8	- 3 1/2	-13.4
Singer	87 7/8	62	2148	85 3/4	80	82 1/2	- 2 1/4	- 2.7
Sperry Rand	55 1/2	36	6799	40 3/8	36	36 1/8	- 1 1/8	- 3.0
Teledyne	86 3/4	76	2379	40	32 1/4	33	- 6 3/4	-17.0
Telex	124	20 3/4	6171	124	90 1/4	116 1/8	+23 5/8	+25.5
University Computing	111 1/2	64 1/4	3280	99	80 7/8	81 5/8	-15 1/4	-15.8
Xerox	115 3/4	85 1/4	8118	115 3/4	102 1/4	111 1/8	+ 6 5/8	+ 6.4
NYSE COMPUTER STOCK AVERAGE							- 5.2	- 5.6
AMERICAN STOCK EXCHANGE								
Applied Data Research	32 7/8	19	180	23 3/4	21 1/2	22 7/8	- 5/8	- 2.7
Automatic D P	47 1/2	34 1/8	1989	47 1/2	41 3/8	45 1/2	+ 2 5/8	+ 6.1
Calcomp	37 1/2	18 1/4	952	28 1/4	23 1/2	24 5/8	- 3 1/8	-11.4
Clary Corp.	25 3/4	7 7/8	240	10 1/2	8 3/4	8 3/4	- 1	-10.3
Computer Applications	21 7/8	9 1/8	513	12 3/8	9 1/8	9 1/2	- 1 7/8	-16.5
Computing and Software	75 3/4	37	1237	75 3/4	63 1/8	71 7/8	+ 6 3/8	+ 9.7
DPA, Inc.	13 5/8	8 1/8	548	10 3/8	8 3/4	8 7/8	- 1	-10.1
Data Proc. Fin. & Gen.	60 1/4	23 5/8	773	32	25 1/4	26 1/2	- 4 5/8	-14.9
Data Products	27 7/8	12 3/8	4065	25 1/2	22 3/8	24	--	--
Digital Equipment	122	54 1/2	1509	122	104 3/8	118	+13 1/8	+12.5
Granite Mgt.	45 1/2	16 3/4	213	22 1/4	19	19 1/4	- 2 3/4	-12.5
Greyhound Computer	28 5/8	12	188	14 1/8	12 1/2	12 3/4	- 3/4	- 5.6
ITEL	37 5/8	14 1/4	1442	25 3/8	19	20 1/8	- 3	-13.0
Levin-Townsend Comp.	57 1/2	14 1/4	1139	19 3/8	14 1/4	15 1/8	- 3 5/8	-19.3
Milgo Elect.	82	17 7/8	4164	82	60	73	+ 5 5/8	+30.0
Mohawk Data Sciences	89 1/8	59 3/4	3015	87	72	82 3/4	+ 9 1/2	+13.0
Potter Instrument	46	23 3/4	1586	38 1/2	32	32 3/4	- 4 7/8	-13.0
Sys. Eng. Labs.	53 7/8	26 1/8	2708	49 1/8	40 5/8	45 1/8	- 2 1/2	- 5.2
AMSE COMPUTER STOCK AVERAGE							+ 4.2	- 3.5

	1969-1970 High Bid	1969-1970 Low Bid	January 16, Bid	January 16, Asked	2 weeks ago Bid	2 week net change Bid	2 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	19	6	7	7 3/8	8	- 1	-12.5
Bolt, Beranek & Newman, Inc.	19	7 1/2	10 1/2	11 1/4	10	+ 1/2	+ 5.0
Computer Usage	40	7	7 1/4	8	7 3/4	- 1/2	- 6.5
Cyber-Tronics	15	7	14 3/4	15 1/4	12 1/2	+ 2 1/4	+18.0
Digitronics	22 1/2	12 3/4	12 3/4	13 3/4	13 3/4	- 1	- 7.3
Fabri-Tek	12 7/8	5 5/8	8 1/4	8 3/4	6	+ 2 1/4	+37.5
Informatics	30 1/4	11 3/4	19	19 3/4	20 3/4	- 1 3/4	- 8.4
LMC Data, Inc.	8 1/4	1 3/4	3 1/4	3 3/4	1 7/8	+ 1 3/8	+73.3
Management Assistance	14 7/8	2 1/8	3 5/8	3 7/8	2 7/8	+ 3/4	+26.0
Optical Scanning Corp.	118	41	51	54	52	- 1	- 1.9
Recognition Equipment, Inc.	83 1/2	52	83 1/2	84 1/2	74 1/2	+ 9	+12.1
TBS Computer Centers Corp.	36	11	20 1/2	21 1/2	19 1/2	+ 1	+ 5.1
Tally Corp.	36	15	19 1/2	21	17 1/2	+ 2	+11.4

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Addressograph-Multigraph	85	55 1/2	888	62	55 1/2	55 1/2	- 4 3/4	- 7.9
American R & D	99 1/2	44	1805	99 1/2	84 1/2	93 1/2	+10	+12.0
Ampex Corp.	49 7/8	32 1/2	1050	48 1/2	44 3/8	44 5/8	- 3	- 6.3
Bunker Ramo	17 5/8	9 1/2	1727	14 3/8	13	13 1/8	- 1 1/8	- 7.9
Burroughs	172 3/4	120 3/4	1683	172 3/4	157 3/4	164 1/8	+ 5 3/8	+ 3.4
Collins Radio	69 3/4	30 1/4	431	37 1/4	30 1/4	30 5/8	- 5 3/4	-15.8
Computer Sciences	34 3/4	19 1/2	3127	33 7/8	30 3/8	31	+ 3	+ 8.8
Control Data	159 1/4	98	4932	122 1/2	98	98 3/4	-20 1/2	-17.2
Electronic Assoc.	25 1/4	9 3/4	863	11 5/8	10 1/8	10 1/8	- 1/2	- 4.7
General Electric	98 1/4	72 3/8	4765	77	72 3/8	74 3/8	- 2 1/4	- 2.9
Honeywell	157 1/4	107 3/4	1558	152	140 5/8	145 1/2	+ 2	+ 1.4
IBM	387	291 3/4	2943	387	366	369 3/4	+ 5	+ 1.4
ITT	60 1/2	46 1/4	3956	60 1/8	57 3/4	57 7/8	- 2	- 3.3
Leasco	54	22 1/2	5791	30 1/2	24 1/4	24 3/4	- 4 3/4	-16.1
Litton	74 1/2	29	13,682	38	27	30 5/8	- 5 7/8	-16.0
Memorex	173 7/8	65	2598	166 3/4	143	160 1/4	+12 1/4	+ 8.3
National Cash Register	171 3/4	108	2722	171 3/4	156 1/4	166	+ 5 1/2	+ 3.4
Planning Research	53 1/4	23 7/8	1141	53 1/4	45 3/4	49 3/4	+ 2 1/4	+ 4.7
RCA	48 1/8	31 1/2	5572	34 5/8	31 1/2	31 7/8	- 2 5/8	- 7.6
Raytheon	50 1/4	27 3/4	1380	33 5/8	27 3/4	28 1/4	- 5	-15.0
SCM	47 1/8	21 7/8	896	24 3/4	22 3/8	22 5/8	- 1 7/8	- 7.7
Sanders	61 7/8	22	1465	29 7/8	25	25	- 1 7/8	- 7.0
Sangamo	43 1/2	19 1/4	283	25 7/8	22 5/8	22 5/8	- 3 1/2	-13.4
Singer	87 7/8	62	2148	85 3/4	80	82 1/2	- 2 1/4	- 2.7
Sperry Rand	55 1/2	36	6799	40 3/8	36	36 1/8	- 1 1/8	- 3.0
Teledyne	86 3/4	76	2379	40	32 1/4	33	- 6 3/4	-17.0
Telex	124	20 3/4	6171	124	90 1/4	116 1/8	+23 5/8	+25.5
University Computing	111 1/2	64 1/4	3280	99	80 7/8	81 5/8	-15 1/4	-15.8
Xerox	115 3/4	85 1/4	8118	115 3/4	102 1/4	111 1/8	+ 6 5/8	+ 6.4
NYSE COMPUTER STOCK AVERAGE							- 5.2	- 5.6
AMERICAN STOCK EXCHANGE								
Applied Data Research	32 7/8	19	180	23 3/4	21 1/2	22 7/8	- 5/8	- 2.7
Automatic D P	47 1/2	34 1/8	1989	47 1/2	41 3/8	45 1/2	+ 2 5/8	+ 6.1
Calcomp	37 1/2	18 1/4	952	28 1/4	23 1/2	24 5/8	- 3 1/8	-11.4
Clary Corp.	25 3/4	7 7/8	240	10 1/2	8 3/4	8 3/4	- 1	-10.3
Computer Applications	21 7/8	9 1/8	513	12 3/8	9 1/8	9 1/2	- 1 7/8	-16.5
Computing and Software	75 3/4	37	1237	75 3/4	63 1/8	71 7/8	+ 6 3/8	+ 9.7
DPA, Inc.	13 5/8	8 1/8	548	10 3/8	8 3/4	8 7/8	- 1	-10.1
Data Proc. Fin. & Gen.	60 1/4	23 5/8	773	32	25 1/4	26 1/2	- 4 5/8	-14.9
Data Products	27 7/8	12 3/8	4065	25 1/2	22 3/8	24	--	--
Digital Equipment	122	54 1/2	1509	122	104 3/8	118	+13 1/8	+12.5
Granite Mgt.	45 1/2	16 3/4	213	22 1/4	19	19 1/4	- 2 3/4	-12.5
Greyhound Computer	28 5/8	12	188	14 1/8	12 1/2	12 3/4	- 3/4	- 5.6
ITEL	37 5/8	14 1/4	1442	25 3/8	19	20 1/8	- 3	-13.0
Levin-Townsend Comp.	57 1/2	14 1/4	1139	19 3/8	14 1/4	15 1/8	- 3 5/8	-19.3
Milgo Elect.	82	17 7/8	4164	82	60	73	+ 5 5/8	+30.0
Mohawk Data Sciences	89 1/8	59 3/4	3015	87	72	82 3/4	+ 9 1/2	+13.0
Potter Instrument	46	23 3/4	1586	38 1/2	32	32 3/4	- 4 7/8	-13.0
Sys. Eng. Labs.	53 7/8	26 1/8	2708	49 1/8	40 5/8	45 1/8	- 2 1/2	- 5.2
AMSE COMPUTER STOCK AVERAGE							+ 4.2	- 3.5

	1969-1970 High Bid	1969-1970 Low Bid	January 16, Bid	January 16, Asked	2 weeks ago Bid	2 week net change Bid	2 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	19	6	7	7 3/8	8	- 1	-12.5
Bolt, Beranek & Newman, Inc.	19	7 1/2	10 1/2	11 1/4	10	+ 1/2	+ 5.0
Computer Usage	40	7	7 1/4	8	7 3/4	- 1/2	- 6.5
Cyber-Tronics	15	7	14 3/4	15 1/4	12 1/2	+ 2 1/4	+18.0
Digitronics	22 1/2	12 3/4	12 3/4	13 3/4	13 3/4	- 1	- 7.3
Fabri-Tek	12 7/8	5 5/8	8 1/4	8 3/4	6	+ 2 1/4	+37.5
Informatics	30 1/4	11 3/4	19	19 3/4	20 3/4	- 1 3/4	- 8.4
LMC Data, Inc.	8 1/4	1 3/4	3 1/4	3 3/4	1 7/8	+ 1 3/8	+73.3
Management Assistance	14 7/8	2 1/8	3 5/8	3 7/8	2 7/8	+ 3/4	+26.0
Optical Scanning Corp.	118	41	51	54	52	- 1	- 1.9
Recognition Equipment, Inc.	83 1/2	52	83 1/2	84 1/2	74 1/2	+ 9	+12.1
TBS Computer Centers Corp.	36	11	20 1/2	21 1/2	19 1/2	+ 1	+ 5.1
Tally Corp.	36	15	19 1/2	21	17 1/2	+ 2	+11.4

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 4,1970 • VOL.5,NO.8 P.J.McGOVERN,EDITOR

Small computer announcement time

IBM ADDS COMMUNICATIONS CAPABILITIES TO SYSTEM/3 AS GE AND HONEYWELL INTRODUCE NEW COMPETITION IN SMALL COMPUTER AREA

For the computer industry, this is the age of communications.

Thus, when IBM announced System/3 last summer (EDP/IR Aug.6,1969), many industry observers were quite shocked. The new "grass roots" computer had no communications capability and, therefore, didn't even meet one of the basic characteristics that describe a third-generation system, much less anything more advanced..

So now, half a year later, IBM's announcement of communications capabilities for System/3 comes as no surprise. The timing of the announcement, however, is quite interesting.

It comes amid a flurry of product releases about small computers -- most of them communications oriented -- from two other computer companies, General Electric and Honeywell. Each of these companies has come out with products that seem designed to nibble away portions of IBM's existing or potential customer base:

- First, in early February, GE announced for the U.S. market its GE-58, a computer designed in Europe and outfitted with up-and-running software. In its concept and capability, this machine frontally attacks IBM's System/3 and is intended for use in a communications environment. Not a completely new machine, the GE-58 is based on a successful line of computers developed in Europe. First installations of this line were in 1966, and over 1000 have been installed outside the U.S.

- Next, toward the end of February, Honeywell launched a sortie against the IBM 1130 with a cleverly named 1530, part of a "new" Series 15 to be marketed by Honeywell's EDP Division. Another member of this family, the 1540, is designed to compete as a communications processor.

- Then early this week, Honeywell marched in another new computer, this one the latest low-end member of its 200 series. Though not communications oriented, the new 115 is a disk-oriented computer system that for the first time gives Honeywell an effective competitor for low-priced general-purpose machines . . . NCR's Century 100 in particular, plus IBM's 360/20 and Univac's 9200.

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All of these machines take advantage of what is considered the easiest way to enter a new segment of the hardware market: Pick a vulnerable area in IBM's product line; design and announce a computer that gives compatibility and more performance at virtually no increase in price; then sell the new computer . . . to users of the IBM product, and to potential users. To increase market penetration, primarily stress the former.

Unfortunately, in at least the first two examples listed above, the manufacturer has introduced problems as well as products. Honeywell, with its 1530, has taken the clearest approach -- giving the 1130 user a doubled capacity at virtually identical cost. But its EDP Division salesmen aren't accustomed to the scientific environment that surrounds many 1130s. Likewise, GE offers real potential competition to System/3. In the U.S., however, it seems to lack the installed base and the marketing talent to be highly successful in the very small systems marketplace. As a result, both companies -- for different reasons -- can be expected to install a certain number of their new computers; neither, however, can really hope to make major inroads into IBM's base.

Also, GE's chances with its GE-58 may be lessened because IBM has added communications capability to System/3. And the situation with Honeywell and its 115 may be different; its press release talks "liberation" for a market of "more than 24,000 installed computer systems." In the following sections, we will discuss the details of this year's early crop of small new computers.

The XX30 ploy by Honeywell

Honeywell's new 1530 -- an $1800-a-month scientific computer -- will be marketed by the company's EDP Division (traditionally concerned with business users) even though its Computer Control Division originally designed and will supply the central processor, the 316 from CCD's "16" series developed for the dedicated application market. (A second member of the Series 15 family -- the 1540 -- is a remote data processor and batch terminal that is expected to be used in teleprocessing networks surrounding Honeywell's 200 series of general purpose computers.)

The marketing strategy behind the 1530 follows the approach outlined above: It offers the IBM customer something approximately compatible to his existing equipment, at about the same price, and "better." Honeywell has spelled out quite clearly where it will point its salesmen to push the 1530. In the February 23rd press announcement, EDP Division General Manager Robert Henderson stated:

> More than 4100 similar [to the 1530] systems are currently in use by business, industry, and educational institutions. They represent a total value of more than $350 million or $7.7-million a month in rental income to one major firm . . . [He obviously refers to the 1130.]

The announcement promised twice the power for about the same money that IBM 1130 users currently pay in rental. In a way, this move by Honeywell is reminiscent of its original H-200 strategy. With a "liberator" package that translated 1401 programs into H-200 compatible software, Honeywell signed up many defectors from the IBM customer base. Otherwise, they likely would have marched obediently into the family of System/360 users. Honeywell is not exactly repeating history. But it has selected a maturing product in IBM's line -- the only major system for which IBM hasn't yet offered an upgrade -- and made the conversion from the 1130 to Honeywell's 1530 manageable to scientific users.

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With this technique, then, Honeywell intends to fill a gap in IBM's product line. The 1130, originally intended for scientific use and as a third-generation upgrade for 1620 users, is not compatible with System/360, except through communications. And Henderson says that many of the "similar competitive systems " mentioned above "are not operating at their maximum and cannot be expanded without a significant increase in monthly rental." The 1530, he continues, "offers users a logical alternative for expansion, without expensive reprogramming." And, the pricetag he puts on the 1530 includes Honeywell's still-bundled services.

Despite all this, Honeywell's announcement paints a somewhat optimistic picture. EDP/IR has examined the Computer Installation Data File maintained by its publisher, the International Data Corporation, and finds that the potential market for the 1530, as announced, includes only some 60% of approximately 5000 IBM 1130s now installed. This is the portion used primarily by scientists and engineers. Thus, some 3000 potential upgrades are available to Honeywell and if, as previous efforts indicate, it could replace 10% to 15%, Honeywell can expect a potential market of 300 to 450 units for its 1530.

And these will probably not form much basis for add-on business (which runs from 10% to 25% a year in most business applications). The reason is simple: The computing needs of small scientific users show relatively slow, steady growth, and computers for these applications normally are obtained and used separately from the bulk of an organization's business data processing equipment.

The 1540, on the other hand, could prove a very valuable item for the EDP Division salesman to have in his kit. It is designed as a communications processor, and no wonder! One of the major applications of the CCD 316, the central processor for the 1540, is as a communications front-end for larger systems -- both Honeywell's and others. This new packaging may be the best way to sell the 316 to certain customers, but to Honeywell's Computer and Communications Group, the net effect could be little more than if EDP Division salesmen simply offered the CCD line for the communications requirements of their customers.

GE eyes the System/3 market

Ever since there was a System/3, General Electric has been selling head-to-head against it in Europe . . . first with its GE-55, then, as of last fall, with its GE-58. And a company spokesman reports that in over half of these confrontations, GE has been winning the order. It's no wonder, than, that GE has chosen to enter selected U.S. markets with its GE-58. For the manufacturer with the "right" small computer, there is a potential market here from 30,000 plus EAM users.

The specs on GE's small business computer appear to be competitive with those of System/3, and GE still offers bundled software and services. So the latest move seems almost obvious. But there are catches: GE's sales force is not oriented to small systems sales; the company has no U.S. base of small users from which to work; and, perhaps most important and despite unbundling, IBM salesmen will still give System/3 customers "guidance" as they move into the computer age.

In addition to tracking down individual system prospects, GE does have another potential market for sales of its 58. The small computer, GE says, can communicate with any standard computer via a Datanet 51 communications controller. Thus, many users of large computers from GE and other manufacturers will perhaps be ordering quantities of the 58s for integration into large reporting systems. This certainly seems appropriate for a company dedicated to computer/communications systems.

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The GE-58 rents for $910 to $2200 a month for card and disk oriented configurations, respectively. IBM's System/3 covers the same price range. Taken item by item, observers think that GE's small system beats out the System/3 in some respects, loses to it in others.

The main point, however, revolves around cracking IBM's dominance of any segment of the computer marketplace. As a rule, engineering brilliance is not the most important aspect; matching IBM's "office on every corner" is the real problem. GE is avoiding this, to some extent, by introducing its 58 only in selected metropolitan areas, at least at the start. This seems very sound, because it simply doesn't have the marketing organization or service capability to match IBM. As a result, GE can't expect to make a significant indentation in System/3's potential, and will probably make most of its U.S. sales and rentals of the GE-58 with its present customer base or with organizations independent enough to select components of their total system from several suppliers.

IBM enlarges the System/3 market

IBM's announcement of communications capability for System/3, to some observers, may look like a direct counter to GE's bringing its 58 to the U.S. This, however, is very unlikely. To most people, communications capability for the System/3 hasn't been a question of If; it has simply been a matter of When?. With "customer deliveries of System/3 with the communications adapter scheduled to start in the first quarter of 1971," IBM apparently is following its standard practice of announcing hardware about a year before delivery begins. (This lag was only six months for the System/3 without communications; many people, however, attribute this to the virtual freeze on product introductions prior to unbundling.)

The adapter will rent for $265 a month, or may be purchased for $12,985. In addition, however, an "adapter attachment," at $35 a month, is "required," and other features for language compatibility will add an additional $55 a month. So the System/3 user is faced with an additional $355 if he desires to use his system in a communications environment, and this isn't insignificant on a computer that has an average monthly rental of only $1400 to start with.

"While System/3 is primarily a computer for smaller businesses," says Howard G. Figueroa, vice president, marketing and development for IBM's Data Processing Division, "we see many areas where it can play an important role in teleprocessing networks. Used both as an on-site computer working independently and as a terminal processor, System/3 offers the kind of flexibility that many multi-location organizations need to help them grow." With the special features mentioned above, the computer will be able to exchange data directly with other System/3s and with all models of System/360 except the 360/44.

The "adapted" System/3 will have several capabilities that would appear advantageous to its use in a teleprocessing system:

- An automatic answering capability will allow a System/3 to answer calls from another computer when the machine is unattended. Incoming data will automatically be stored on a disk file or punched into 96-column cards.

- An "optional feature" will enable a System/3 to dial up another computer under program control. IBM says "the user can tell the machine under what circumstances he wants it to start and stop

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transmitting by writing the appropriate instructions and storing them in the computer's memory."

- The System/3, as adapted, can also function as one station on a communications line with other IBM computers and terminals such as the 1130, the 1800, the 2770 and 2790 data communication systems, and the 2780 data transmission terminal -- all of which have IBM-developed binary synchronous capabilities. Depending on the type of line selected, the machine can handle data at medium speeds (600 to 4800 bits per second) or high speeds (up to 50,000 bps).

Interestingly enough, the American Standard Code for Information Interchange (ASCII) or Extended Binary Coded Decimal Interchange Code (EBCDIC) can be selected by the user as his transmission code. In the past, although ASCII is the most widely used interchange code, IBM has pushed EBCDIC, which it developed.

The mere fact that ASCII is talked about in the recent announcement is probably in response to implied Government pressure: H.R.J. Grosch, head of the National Bureau of Standards' Center for Computer Sciences and Technology, put out the word that the U.S. Government shouldn't purchase any communications equipment that didn't accept ASCII inputs.

In the final analysis, then, IBM has done what was expected: It has provided the means for its "new low-cost computer to 'talk' over telephone lines to other IBM computers." It has added a major missing element to its new computer system, and in a sense justified EDP/IR's projection that it would ship between 25,000 and 30,000 System/3s during the next three years.

The effect of System/3 on IBM's shipments or revenues, however, will be only minor. As the system goes into full production by 1971, it should account for 8% to 10% of the value of IBM's shipments during the following three years, and revenues from it should gradually grow from 1% to 3% of IBM's total. What is more important, however, is that IBM's base of computer customers will be vastly broadened; and one thing about IBM customers is that they all upgrade . . . and most of them stay with IBM. This is just one more way of the camel getting its nose under the tent. And, to continue the desert proverb, once this happens, the camel usually gets all the way into the tent.

Honeywell sets out to "liberate" small competitive equipment

Apparently, Honeywell decided it isn't getting its "fair share" of business from the low-cost marketplace where computer systems, according to Honeywell, rent in the $2500 to $6000 per month range. In addition to the 110 and 120 from Honeywell's 200 series, this market segment includes IBM's 360/20s, the NCR Century 100, the Univac 9200, and some smaller IBM 1401s. Honeywell says this market is made up of more than 24,000 systems representing about 38% (in number) of all computers currently in use in the United States.

To improve its standing in this market, Honeywell this week announced the latest member of its 200 series, the Model 115. This is a disk-oriented system, and some of its features are as follows:

- Using several "proven Liberator techniques, such as RPG to Cobol and Easytran," the announcement says, "programs and applications now run on competitive small systems can be converted for use on the Model 115 with a minimum of effort."

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- The 115 is a fully integrated circuit computer with a main memory cycle time of 2.75 microseconds. This is faster than either the 110 or 120, yet will cost the customer less for similar configurations.

- The "typical" 115 system will lease for $2,625 a month on a five-year contract, or may be purchased for $125,890. In configurations with 16K, 24K, or 32K characters of core memory, the central processor and memory are priced at only 65% that of the 110 or 120.

- The new system is designed for use with Honeywell's Type 172 disk drive, which accepts industry-standard 10-surface, single-density disk packs. This is Honeywell's drive that is compatible with the 2311 from IBM.

Following the announcement, there was an exceptional display of enthusiasm from the Honeywell sales force. The 115, with deliveries scheduled for June, is expected to help Honeywell counter the success of the Century 100 as well as convert some 360/20 users -- particularly those, perhaps, who would rather be with a manufacturer offering bundled services. In addition, the new computer is expected to be helpful in the European market where GE's 100 series is doing well.

Prognosis

This flurry of new product announcements, it seems to EDP/IR, confirms several trends within the computer industry:

- Manufacturers are definitely looking to the small user as a source of new business. Sales to this market aren't big ticket items, but they build a base from which future business will develop.

- The industry is definitely in a transition or evolutionary stage. None of the products described above is really new; all are based on the mature products already in use; each, in its way, takes advantage of new technology and applies it to an existing family of computers.

- During this evolutionary period, communications will play an ever increasing role, with more and more mainframes talking or listening to other computers. Indeed, by 1972 or 1973, half the computers shipped will be used in a communications environment.

Thus, even though all major manufacturers obviously have some type of new product line in the works, it would appear obvious that these products will in some way be compatible with existing families. It is quite difficult to imagine a manufacturer starting, at this time, to build a base of small users only to introduce noncompatible new equipment a few years hence.

International Computers Ltd., Britain's giant computer company, has teamed up with Barclays Bank's customer service division to form a jointly owned computer service bureau operation. ICL's International Computing Services Ltd., already doing business of some $7 million a year, will form the nucleus of the new enterprise that is expected to start operations in June.

According to EDP Europa Report, EDP/IR's sister publication in London, the new venture may help ICL's equipment sales to Barclays. At present, most of Barclays' computing equipment in the UK is built by Burroughs or IBM, but its overseas operation has several ICL machines, including the first ICL computer in the U.S. (a 1902A in New York City).

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NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

ARTRONIC INFORMATION SYSTEMS, INC.

Artronic Information Systems, Inc., 155 E. 44th St., New York, 10017, a firm providing management consulting in fields which include data processing, on Jan. 5 filed 105,000 common, at a price to be set by amendment ($2.75 max.). Also included in this statement are 57,500 outstanding shares.

COMPUTER BUSINESS SUPPLIES INC.

Computer Business Supplies, Inc., 3515 V. Street, NE, Washington, D.C., 20018, a business forms supplier organized in March of 1969, on Dec. 29 filed 325,000 common and 325,000 common purchase warrants (to be offered on a one-and-one basis). The proceeds, at $1 per unit, will be used to establish a warehouse, repay a bank loan, purchase business forms, pay salaries, for start-up costs of a proposed sales office, and for working capital. The underwriter will be Max Zerkin & Associates, Inc. of Bethesda, Maryland.

DASA CORP.

DASA Corporation, 15 Stevens Street, Andover, Mass. 01810, a computer leasing and peripherals manufacturing firm, on Jan. 15 filed 149,923 outstanding common, and on Dec. 29 filed 72,894 outstanding common, to be offered for sale from time to time at prices current at the time of sale (but not more than $37.50 and $36.625, respectively).

ITEL CORP.

Itel Corporation, 1 Bush St., San Francisco 94104, a computer services and leasing company, on Jan. 21 filed $21 million worth of convertible subordinated debentures, due 1995. Proceeds, at terms to be supplied by amendment, will be used for working capital, for use in rental programs of Intercontinental Systems, Inc. and by an Itel subsidiary, and for general corporate purposes including possible acquisitions. The underwriter will be Glore Forgan Staats Inc., Bank of America Center, San Francisco.

MEDICAL SYSTEMS INC.

Medical Systems, Inc., 312 E. Wisconsin Ave., Milwaukee, Wisc. 53202, organized in March 1969 to provide computerized billing and related services for medical practitioners, on Jan. 19 filed 100,000 common. The proceeds, at $10 a share, will be used for development and marketing of services, expansion of staff, other expenses including the lease of a computer and general corporate purposes. The underwriter is the B.F. Seligmann Co., Inc., 110 E. Wisconsin Ave., Milwaukee.

OPERATIONS ANALYSIS INC.

Operations Analysis, Inc., Melrose Bldg., Houston, Tex. 77002, a computer services company, on Jan. 13 filed 100,000 common. The proceeds, at a price to be supplied by amendment ($7.50 max.) will be used to establish the company's bank data processing capability, for acquisition of additional equipment, for program development, and for other corporate purposes. The underwriter is S.J. Salmon & Co., Inc., 101 Maiden Lane, New York.

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DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

January 19, - January 30, 1970

	1969-70 High	1969-70 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	85	50	1094	55 3/4	50	50	- 5 1/2	- 9.9
American R & D	99 1/2	44	2328	96 1/2	85	88	- 5 1/2	- 5.7
Ampex Corp.	49 7/8	32 1/2	2359	44 3/8	35 1/2	38	- 6 5/8	-14.9
Bunker Ramo	17 5/8	9 1/2	1432	13 5/8	11 5/8	11 5/8	- 1 1/2	-11.5
Burroughs	172 3/4	120 3/4	2338	164 3/8	153 1/8	154 1/2	- 9 5/8	- 5.9
Collins Radio	69 3/4	24 1/8	887	30 3/4	24 1/8	25	- 5 5/8	-18.4
Computer Sciences	34 3/4	19 1/2	4752	32 1/4	28	28 1/4	- 2 3/4	- 8.9
Control Data	159 1/4	70 1/8	6297	101 1/4	70 1/8	73	-25 3/4	-26.0
Electronic Assoc.	25 1/4	8 1/8	541	10 1/2	8 1/8	8 3/4	- 1 3/8	-13.2
General Electric	98 1/4	72 3/8	3473	75	72 3/8	72 3/8	- 2	- 2.7
Honeywell	157 1/4	107 3/4	1942	144 3/8	134 1/4	136 1/2	- 9	- 6.2
IBM	387	291 3/4	5795	359	334 1/4	335 1/4	-34 1/2	- 9.3
ITT	60 1/2	46 1/4	3699	57 3/4	54 1/8	54 3/4	- 3 1/8	- 5.4
Leasco	54	19	5837	24 3/4	19	19 3/4	- 5	-20.1
Litton	74 1/2	24 3/8	5353	30 1/2	24 3/8	25	- 5 5/8	-18.6
Memorex	173 7/8	65	2559	161 3/4	143 1/2	144 1/2	-15 3/4	- 9.8
National Cash Register	171 3/4	108	5307	164 3/4	135 3/8	136	-30	-18.0
Planning Research	53 1/4	23 7/8	1074	50	42 3/4	42 7/8	- 6 7/8	-13.8
RCA	48 1/2	30 1/4	3211	32 1/4	30 1/4	30 1/4	- 1 5/8	- 4.2
Raytheon	50 1/4	26 1/2	1150	30 3/8	26 1/2	26 1/2	- 1 3/4	- 6.2
SCM	47 1/8	19 1/8	1808	22 3/4	19 1/8	19 1/8	- 3 1/2	-15.4
Sanders	61 7/8	21 1/2	713	25 1/2	21 1/2	22	- 3	-12.0
Sangamo	43 1/2	19 1/4	1189	28 3/8	21 1/8	25	+ 2 3/8	+10.5
Singer	87 7/8	62	830	84	77	77 1/8	- 5 3/8	- 6.5
Sperry Rand	55 1/2	34 1/4	5325	38 7/8	34 1/4	34 3/8	- 1 3/4	- 4.9
Teledyne	45 1/2	28	3477	34 1/4	28	28 5/8	- 4 3/8	-13.2
Telex	159 1/2	20 3/4	9223	159 1/2	113	141 3/4	+25 5/8	+22.0
University Computing	111 1/2	59 1/2	6255	81 1/4	59 1/2	62 1/4	-19 3/8	-23.5
Xerox	115 3/4	85 1/4	6964	108 3/4	99 1/2	100 5/8	-10 1/2	- 9.5
NYSE COMPUTER STOCK AVERAGE							- 6.9	- 9.7
AMERICAN STOCK EXCHANGE								
Applied Data Research	32 7/8	19	170	23 3/4	20 1/2	20 1/2	- 2 3/8	-10.4
Automatic DP	47 3/4	34 1/8	1521	47 3/4	41 3/4	43 1/4	- 2 1/4	- 4.9
Calcomp	37 1/2	18 1/4	720	26 1/8	23 1/4	23 1/4	- 1 3/8	- 5.6
Clary Corp.	25 3/4	7 7/8	159	9 3/8	8 1/4	8 1/4	- 1/2	- 5.7
Computer Applications	21 7/8	6	424	9 5/8	6	7 1/2	- 2	-21.0
Computing and Software	75 3/4	37	1253	74	67 1/2	68 5/8	- 3 1/4	- 4.5
DPA, Inc.	13 5/8	7 7/8	390	9	7 7/8	8	- 7/8	- 9.9
Data Proc. Fin. & Gen.	60 1/4	22	882	26 7/8	22	22 1/4	- 4 1/4	-16.0
Data Products	27 7/8	12 3/8	5098	24 1/4	18 1/2	19 3/4	- 4 1/4	-17.8
Digital Equipment	124	54 1/2	1623	124	107 3/4	112	- 6	- 5.1
Granite Mgt.	45 1/2	14 1/4	443	19 7/8	14 1/4	14 1/4	- 5	-26.0
Greyhound Computer	28 5/8	11 1/2	152	13 1/4	11 1/2	11 1/2	- 1 1/4	- 9.8
ITEL	37 5/8	14 1/4	1504	25 1/2	19 1/8	19 3/8	- 3/4	- 3.7
Levin-Townsend Comp.	57 1/2	12 1/8	1753	15	12 1/8	12 3/8	- 2 3/4	- 1.8
Milgo Elect.	84 1/2	17 7/8	5746	84 1/2	65 1/2	72 7/8	- 1/8	- 0.2
Mohawk Data Sciences	89 1/8	59 3/4	4294	83 3/4	74	75	- 7 3/4	- 9.4
Potter Instrument	46	23 3/4	1546	32 3/4	27 1/2	30 3/4	- 2	- 6.1
Sys. Eng. Labs.	53 7/8	26 1/8	2697	45	37 1/4	39 1/4	- 5 7/8	-13.0
AMSE COMPUTER STOCK AVERAGE							- 2.9	- 9.5

	1969-70 High Bid	1969-70 Low Bid	January 30, Bid	January 30, Asked	2 weeks ago Bid	2 weeks net change Bid	2 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	19	3 5/8	3 5/8	4	7	- 3 3/8	-48.0
Bolt, Beranek & Newman, Inc.	19	7 1/2	8 1/2	9 1/2	10 1/2	- 2	-19.0
Computer Usage	40	6	6	6 3/4	7 1/4	- 1 1/4	-12.0
Cyber-tronics	15	7	12 3/4	13 1/4	14 3/4	- 2	-13.6
Digitronics	22 1/2	12 3/4	13	14	12 3/4	+ 1/4	+ 2.0
Fabri-Tek	12 7/8	5 5/8	6 1/2	7	8 1/4	- 1 3/4	-21.2
Informatics, Inc.	30 1/4	11 3/4	16	16 1/2	19	- 3	-15.8
LMC Data, Inc.	8 1/4	1 3/4	2 3/4	3 1/4	3 1/4	- 1/2	-46.0
Management Assistance	14 7/8	2 1/8	3	3 1/4	3 5/8	- 5/8	-17.2
Optical Scanning Corp.	118	40	40	43	51	-11	-21.5
Recognition Equipment Inc.	83 1/2	52	66 1/2	68	83 1/2	-17	-20.3
TBS Computer Centers Corp.	36	11	23 1/2	24 1/2	20 1/2	+ 3	+14.6
Tally Corp.	36	15	18 1/2	20	19 1/2	- 1	- 5.1

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REVIEW + FORECAST ISSUE

EDP industry report

• A NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 12,1970 • VOL.5,NO.9 P.J.McGOVERN,EDITOR

The end of the beginning?

MATURE PRODUCT LINES . . . AND UNBUNDLING RESULT IN LEVEL COMPUTER SHIPMENTS BUT SIGNIFICANT INCREASE IN REVENUES

During the decade of the 1960s, the scientific "plaything" called an "electronic brain" became an important tool for science and business, and spawned an industry that seems well on its way to becoming one of the most important in the world as it affects more and more portions of man's activity.

Indeed, the industry could not have been better described by a more appropriate person than Thomas J. Watson Jr., IBM board chairman, in this year's Letter to Stockholders. He called it ". . . an industry which I believe is still in its formative years and has almost limitless potential."

Certainly, if the past and our projections are any indication, the industry's potential is almost limitless. During 1969, U.S. companies chalked up over $10 billion in revenues from their computer industry activities . . . ten times the corresponding figure for 1960. In 1974, revenues of some $25 billion are expected.

And, as the decade of the 1970s begins, the industry may well be in a formative period . . . a stage of maturation during which the outlook remains excellent but for which the pattern is changing. Hardware remains dominant in terms of dollars, but year by year it loses excitement as more glamorous facets of the industry have room in which to become substantial submarkets in their own right.

During the next few years, the overall value of computer shipments may well remain constant or increase by less than a study of history might indicate. During this period, manufacturers will be supporting and augmenting mature product lines and making no substantial deliveries of yet-to-be-announced products. The impact of unbundling still clouds the atmosphere. This effect, in fact, started to show up in the results of the year just past:

- For the first time in computer industry history, shipments in 1969 didn't increase; they remained essentially level at $7.2 billion.
- Revenues from computer systems, however, increased about 12% for the year and — perhaps indicative of the new era being entered — they equalled the $7.2 billion of shipments by U.S.-based companies.
- Also, revenues for the entire industry were up 21% to $10.1 billion, and should increase by 18% to 20% annually until the mid-1970s, at least.

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Across-the-board, in fact, the outlook for the computer industry continues to be more than promising. Everything considered -- hardware, supplies, services, and software -- computer industry revenues, which tripled during the last five years of the 1960s, are expected to increase another two-and-a-half times by the mid-1970s. EDP Industry Report forecasts that computer industry revenues for U.S. companies will approach $25 billion in 1974.

Shipments versus revenues

In previous Review and Forecast issues, EDP/IR has measured the size of the computer hardware industry in terms of new equipment shipments. This gives an accurate assessment of the productivity of the various manufacturers; also, it determines the base from which future revenue will be generated. The reporting of these shipments, naturally, will be continued.

But revenue is what shows up on the balance sheets of the companies in the industry. It reflects rentals from systems that were shipped in previous years, the total amount of equipment actually sold, but not other income (in the hardware tables in this issue). This "other" area, of course, is becoming increasingly important as IBM and some of the other manufacturers start to operate under unbundled pricing, charging separately for software, education, systems engineering, and the like.

Because revenue is important, EDP/IR this year has estimated the amount that computer manufacturers receive from both rentals and outright sales. These estimates for 1969 and prior years, as well as our projections for future years, are shown in Table I along with other key industry sectors. Thus, for the first time, we are presenting an alternate measurement of the computer industry . . . an estimate of direct revenue received by U.S. companies from computer activities.

Growing importance for non-hardware?

The computer industry is big . . . and growing. As Table I illustrates, U.S. companies in the industry will see computer-related revenue grow from just over $10 billion in 1969 to almost $25 billion in 1974. And most people who study the computer industry have a "feel" for the 18% to 20% yearly growth this implies.

On the other hand, many of the same people believe that hardware is decreasing in importance, that software and services are the exciting growth areas for the 1970s. The latter is true; the former is not. Hardware -- including general-purpose systems, dedicated application computers, and independent peripherals -- over the last five years and during the next five years accounts for about three-fourths of computer-related revenue of all types.

This is not to say the other areas aren't important. Just less than half a billion dollars was spent for software last year and, by 1974, over $2.5 billion is expected to be paid to companies other than the mainframe manufacturers. Similarly, almost $2.5 billion will be spent for independent services. But neither of these will quite reach the revenue generated by general-purpose computers as far back as 1965, when shipments of third-generation equipment barely were beginning.

Even within the hardware portion of the market, dedicated application computers (primarily minicomputers) and independent peripheral equipment (including terminals) will have growth rates higher than that for general-purpose computers. But these systems, in 1974, will still account for 62% of industry revenues.

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TABLE I -- WORLDWIDE TOTAL REVENUE
ESTIMATED & PROJECTED REVENUE TO AMERICAN-BASED COMPANIES FROM KEY SECTORS OF THE EDP INDUSTRY
($ Millions)

	General Purpose Computers	Dedicated Application Computers	Independent Peripheral Equipment	Data Processing Supplies	Computing & Data Processing Services	Contract & Packaged Software	Total
1960	120	10	40	370	135		675
1961	885	20	50	485	180		1,620
1962	1,210	35	115	530	220		2,110
1963	1,760	60	130	595	265	5	2,815
1964	2,220	105	140	630	295	20	3,410
1965	2,470	120	150	660	355	50	3,805
1966	3,440	145	180	740	425	100	5,030
1967	4,420	220	270	850	530	175	6,465
1968	5,510	315	360	960	715	270	8,130
1969	6,780	430	435	1,075	940	450	10,110
1970	7,990	590	560	1,185	1,200	700	12,225
1971	9,350	770	710	1,290	1,500	1,050	14,670
1972	10,810	980	890	1,390	1,810	1,470	17,490
1973	12,300	1,180	1,100	1,500	2,130	1,970	20,680
1974	13,800	1,370	1,340	1,610	2,440	2,560	24,320

GENERAL PURPOSE (Group A) computers, see page 16. Revenues, from rental and sales, growing about 17% a year.

DEDICATED APPLICATION (Group B) computers, see page 18. Most machines are purchased and scrappage is very low.

INDEPENDENT PERIPHERAL EQUIPMENT is supplied by companies other than the mainframe manufacturer. Sales, including terminals, increased 21% in 1969. Growth is expected to pick up another 30% during 1970.

DATA PROCESSING SUPPLIES includes tape and disks, but paper and punched cards account for over 75% of the business. This sector has lowest overall growth rate.

COMPUTING & DATA PROCESSING SERVICES include service bureaus, on-line batch, Rair (remote access/immediate response) and time sharing. Total revenues were up 31% in 1969. Of this, conventional batch service bureaus had a 25% growth rate while on-line computer services grew by over 67%. Total growth this year is projected at 28%.

CONTRACT & PACKAGED SOFTWARE gave independent suppliers the greatest relative increase of any sector in 1969, with income up 66% to $450 million. A 55% rise is expected in 1970 as unbundling becomes effective.

IBM SHIPMENTS OFF 5%, BUT INSTALLED BASE UP MORE THAN 15%

IBM didn't have a bad year, but it had a year in which shipments actually decreased. Perhaps it was the year which Chmn. Watson, for almost two years, has been warning IBM stockholders to watch for:

> . . . gross income and earnings showed relatively modest rates of growth. Stockholders will recall that outright sales of data processing equipment were abnormally high in 1968, and that we pointed out on a number of occasions that outright sales, unlike rentals, increase current income at the expense of future periods. . . IBM's gross income from rentals and service increased by 15.1% during 1969. Because IBM's business is primarily rental, we believe this to be a significant measure of the Company's progress during the year.

EDP/IR estimates that although IBM's shipments for 1969 were off 5% to $4.95 billion, it did have a 15% to 17% increase in its installed base. Thus, the company would appear to be reasonably on schedule. Sales to leasing companies fell from over $1.1 billion in 1968 to about $500 million last year. At yearend 1969, as a result, IBM had about 70% of its installed base on rental, 9% owned by leasing companies, and the remaining 21% owned by users themselves.

During 1969, the equipment shipped by IBM tended to follow its historical mix by price class . . . with one exception. For probably the first time ever, IBM shipped fewer than 60% of the computers in a given submarket. Its shipments of computers in the Small category slipped to 59%. This was due, primarily, to NCR's success with its Century 100 coupled with Univac's continued good results with its 9200. In the table below, we have summarized IBM's shipments, by number within each price class, in the U.S. market. These figures are based on the Computer Installation Data File maintained by the International Data Corporation, publisher of EDP/IR:

IBM'S PENETRATION BY PRICE CLASS
(Shipments of general-purpose systems, by number, U.S. only)

Price Class (Monthly Rental)	System/360 Model	1967	1968	1969
[redacted]				

The big news of 1969, of course, was the unbundling announcement which came during the summer. As the Letter to Stockholders described it:

> On June 23, 1969, we announced a change in the way we would charge for and support our data processing equipment. Basically, the change was to offer certain systems engineering activities, most customer educa-

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tion courses and many future computer programs for a charge. In the past these had been provided to our customers without separate charge.

In addition, IBM lowered its hardware prices by 3% and began active marketing of specialized custom contract services. The actual effect of unbundling on IBM revenues is still a matter for some speculation, since computer users still don't completely understand the concept and are being quite cautious, especially during the present period when many budgets are pinched.

Best estimates at present are that IBM's 1970 revenue from unbundled services will amount to $225 million to $275 million and that revenue from lease of program products will be an additional $50 million to $125 million. We have given an unusually wide spread in our estimate for program products because the rate of introduction is uncertain, most products announced to date have been applicable to only a small percentage of IBM's customers, and there well may be an unwillingness of customers to buy program products . . . especially at first. EDP/IR is presently conducting an on-going study of this area, and results will be reported as soon as they are available.

At the beginning of 1970, IBM's backlog amounted to about $4 billion of System/360 equipment and about $75 million of System/3 equipment. This would lead to the conclusion that the value of IBM's shipments could be off slightly in 1970 . . . due to the 3% price reduction if nothing else. Our best estimate at present is that IBM's 1970 shipments will hold relatively steady again this year, and perhaps could increase slightly if its World Trade operations continue the pace set during 1969.

There's another element in the IBM picture, of course. The industry giant has several major antitrust suits pending in the courts (EDP/IR Nov.28,1969), and legal experts anticipate that they will remain tied up for at least several more years. After each suit was filed, IBM announced that it would defend "vigorously" or "forcefully." Some of this vigor apparently means proving to the world that the computer industry is competitive. This attitude is reflected by company executives, and Watson, in his Letter, suggests the same thing:

> Data processing is one of the world's fastest growing industries with competition continuing to grow both in numbers and in marketing effectiveness. This competition has benefited the entire industry by forcing all of us to be at our creative best in lowering the cost of computation and in devising new applications for data processing equipment.

"OTHER" COMPUTER MANUFACTURERS AVERAGE 13% INCREASE IN SHIPMENTS

There was an interesting phenomenon in new computer shipment activity during 1969: Across the board, shipments were level, with IBM down 5% (see above) from 1968, and the total of all the other manufacturers up, on average, 13%. Among the others, however, there were many variations from the norm. Two manufacturers -- Control Data and RCA -- had a larger percentage drop than did IBM; and three more -- Burroughs, NCR, and Digital Equipment -- shipped new computer equipment at from almost one-and-a-half to nearly two times their 1968 level. (See Table II.)

The current status of and outlook for the computer industry as a whole, and for IBM in particular, have been reviewed above. In the following section we present our end-of-the-decade review and outlook for the other major manufacturers that, along with IBM, constitute the mainframe sector of the computer industry:

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TABLE II
STATUS OF WORLDWIDE COMPUTER MARKET FOR U.S.-BASED MANUFACTURERS

	1969 Shipments: $M	% Total	1968-69 % Change	Yearend 1969 In Use: $M	% Total
IBM	4,950	69.0	- 5	21,540	69.7
Univac	400	5.6	+ 5	1,810	5.9
Honeywell	340	4.7	+15	1,320	4.3
Burroughs	305	4.3	+45	980	3.2
[illegible]	290	4.0	+15	1,230	4.0
CDC	255	3.6	-15	1,340	4.3
[illegible]	230	3.2	-10	1,050	3.4
[illegible]	195	2.7	+90	690	2.2
[illegible]	75	1.1	0	280	0.9
[illegible]	60	0.8	+55	270	0.9
Others	70	1.0	+50	360	1.2
Totals	7,170	100.0	0	30,870	100.0

Univac continues to hold the Number 2 position in terms of value of installed equipment and, as in 1968, last year ranked second in shipments with $400 million. This was primarily due to Univac's activity in the international marketplace: Shipments outside the U.S. accounted for more than 40% of Univac's total for 1969.

The majority of Univac's 1969 shipments were 1108s, 9300s, 9200s, and 9400s (ranked by importance in terms of total dollar value). As a result, Univac maintained its relatively high penetration in the Small computer submarket (see page 4), with the 9200 accounting for 12% (up from 11%) of Small system shipments during 1969. First deliveries of the 9400 gave Univac 3% of the Medium priced computer shipments. And in the Very Large submarket, the 1108's percentage of shipments dropped from 17% in 1968 to 10%. This computer is in its fifth year of production, and a decline in shipments is not unusual. The "successor" to the 1108, the 1106, was announced during 1969, but initial orders appear to be coming in much more slowly than the original success of the 1108 would have indicated.

As we pointed out last year, Univac was in the process of adding much more peripheral equipment to its product line. This has resulted in a new division with a charter for developing and marketing peripherals, and this operation could develop into a major factor in the independent peripheral market. But Univac seems to be de-emphasizing its service bureau business. It has sold a few 1108 centers as well as some smaller, batch-oriented centers to independent organizations.

Univac is an important part of its parent, Sperry Rand. During 1969, an estimated $500 million, or 29% of total corporate revenues of $1.72 billion, was generated from general-purpose computer activities. Looking ahead into 1970, we estimate only a $345 million backlog, so Univac will likely have a 5% to 10% decrease in shipments. This would reduce its market share and -- since a reasonably large percentage of its computers are sold outright -- perhaps would impact its revenue from computers, at least as a percentage of the parent corporation.

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Honeywell's 1969 shipments increased 15% to $340 million, giving it 4.7% of shipments and bringing its installed base to the $1.3 billion level, tied with CDC for the Number 3 spot. This large base is quite important to Honeywell, since most of it reflects equipment installed on a lease basis and therefore represents guaranteed future revenues.

During 1969, Honeywell was more successful with its U.S. shipments (about 5% of the U.S. total, and roughly the same as Univac's) than with those to the international marketplace. On a value shipped basis, the most important computer systems to Honeywell were the 1250, 2200, 8200, 125, and 120, in that order. In terms of submarkets, Honeywell slipped from 12% to 9% in the Small area; first entered the Large and Very Large, with 3% each, as deliveries of the 4200 and 8200 began; and for the third year in a row increased its shipments in the Medium submarket another 2%, from 14% to 16%.

Even though its prices remain bundled, Honeywell -- through its Computer and Communications Group -- continues to operate as The Other Computer Company, an advertising theme adopted over two years ago. In fact, the CCG contributed $350 million, or 25% of Honeywell's corporate revenues of $1.4 billion in 1969. Included in Honeywell's computer-related activities are: the EDP Division, with responsibility for Series 200 computer systems; the Computer Control Division, which offers Honeywell's Series 16 dedicated application computers and its time-sharing 1648; the Information Services Division with time sharing, remote and standard batch processing, and specialized software; the Data Products Division with products such as Keytape and disk packs; and the Communications Division, for developing special communication-oriented systems.

At yearend 1969, Honeywell's backlog was about $300 million, which would indicate that 1970 shipments might be off by 5% - 10%. Its recently announced Series 15 and general-purpose 115 (EDP/IR Mar.4,1970) -- both of which have delivery dates during this year -- may offset this. Any new product line -- still expected to be program compatible with IBM's System/360 and microprogram compatible with Honeywell's Series 200 computers -- will probably not be announced this year, since reports are that the new product planning is still behind schedule.

Burroughs had the second largest % shipment increase by a major manufacturer (up 45% from 1968) and climbed from sixth to fourth place with $305 million or 4.3% of 1969 shipments. Much of this increase is attributable to the 3500, which has climbed from 2% to 6% to9% of the Medium submarket during the last three years. The older 5500 dropped from 9% to 4% of the Large submarket, but even this 4% is unusual for the industry: B-5000/5500-type computers were first installed in 1963 and, thus, have the longest active marketing and manufacturing life of any computer -- more than seven years.

Again last year, Burroughs was active only in the hardware area, in which it is expanding its activities. The TC-500 has been very successful as a terminal, being ordered by IBM users as well as Burroughs computer customers. In addition, Burroughs has recently announced a key-to-tape device, a keypunch, and COM (computer output to microfilm) equipment.

The company has an estimated $455 million backlog of computer equipment -- highly concentrated in 6500s and 3500s -- and may be one of the few major manufacturers to show a continued growth in new shipments during 1970. Corporate revenues from computer equipment last year were an estimated $315 million, or 41% of the $759 million total. Thus, 1970 or 1971 should be the year when over half of Burroughs revenues are from activities in the computer industry.

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General Electric's shipments increased 16% to $290 million, bringing its overall share of shipments from 3.5% in 1968 to 4.0% in 1969. The bulk of the increase, however, was in the international marketplace where the company -- through Bull-GE and GE Information Systems Italia -- did about 55% of the company's computer business. A closer look shows that GE accounted for 2.7% of U.S.-based companies outside the country.

And GE's activity is a good example of how mature products can be important in today's rental market. The 200 product line is profitable and, during 1969, the 600 line -- which dates back to the mid-1960s -- accounted for 68% of GE's domestic shipments and about 22% of its international shipments. The 600's penetration of the Very Large submarket, indeed, shows the phases through which such a system can pass: In 1967 (the 600's third year of shipments), it accounted for 6% of the Very Large sector; in 1968 (because of initial hardware and software problems) it dropped to 3%; and in 1969 -- with renewed marketing efforts and the new GECOS operating system -- it shipped 8% of this market.

In addition to manufacturing mainframes, GE has a real computer industry claim to fame through the offer of time sharing, an area its Information Systems Division pioneered with the 200 line of computers and the Basic language. GE remains the leader in this field, but its percentage has dropped from some 40% in 1968 to about 31% (of a doubled market) last year. With growth somewhat below expectations and in the face of intense competition, GE has concentrated its time sharing service in larger computers located in fewer area. As a result, it announced certain cutbacks and realignments of sales offices. GE continues to be the largest single factor in this market; it is expanding both in the U.S. and abroad, and its business strategy in this area seems to be on the proper path -- selling software as well as raw computer time through the terminals.

For GE, of course, computer-related activity is only a small portion of corporate business. Last year, GE's estimated $305 million of revenue in this area accounted for only 3.5% of the corporation's $8.8 billion total. And with an estimated backlog of $275 million in hardware, GE's shipments during 1970 could be some 5% lower than in 1969. Additional revenues from its GE-58 and its time-sharing services, however, could add up to an overall increase.

Control Data's share of shipments dropped from 4.2% in 1968 to 3.6% in 1969 as shipments declined some 15% to $255 million. The five-and-a-half-year old 6600 accounted for 59% of total shipments, and only two of the new 7600s were shipped. The company is obviously feeling the pinch of reduced Federal spending, both in deliveries directly to the Government and in those to companies and universities that rely on Government funding. And the older and less expensive 3000 series equipment just doesn't have the customer demand to take up the slack.

On the other hand, CDC is one of the largest suppliers of peripheral equipment to other computer manufacturers, and the company has been active in marketing of computer-related supplies, including disk drives and packs. It also could gain from unbundling. Last fall (EDP/IR Nov.7,1969), in reaction to IBM's unbundling announcement, CDC followed suit and raised prices across the board by 4% to 6%. It even separated out maintenance, one step IBM didn't take.

Also, CDC is continuing to expand its Cybernet service network which includes seven 6600s and five 3300s. Through this network, CDC offers on-line batch service, primarily for customers who need the power of a 6600 for short periods of time.

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The 7600 is eventually scheduled to be put into some of these centers. Otherwise -- even though this supercomputer has the best price/performance ratio of any computer and a two-year lead time on the comparable IBM 360/195 -- it apparently still appeals almost exclusively to large scientific laboratories. CDC, of course, would like to see some 7600s in pure commercial applications, and as the line of peripheral processors is developed, this could happen . . . if the CDC salesmen can orient their thinking toward business customer sales.

CDC has an estimated backlog of only $230 million, and most of its major products have a long lead time before delivery. Thus, the company can be expected to have another 10% decrease in shipments during 1970. Since it now has Commercial Credit Corp., however, this will not impact the company the way it would have previously: In 1969, CDC's computer-related hardware revenues were only $385 million, or 29% of the total of $995 million reported.

RCA slipped in its share of shipments, also. From 3.6% in 1968, the company dropped 10% in worldwide shipments to $230 million, or 3.2% of the total for U.S.-based companies. It, too, has a maturing product line that is more than four years old, and has apparently adopted a marketing strategy that avoids the Small submarket and downplays the Spectra 70/15. RCA seems to have concentrated on the larger, communications oriented 70/35 and 70/45 and has put particular emphasis on sales to state and local government organizations.

One area of relative success for RCA has been in the Large submarket, where its 70/55 and the 70/46 time-sharing system accounted for 1% in 1967, 5% in 1968, and some 7% last year. Its larger machines -- the 70/60 and 70/61 -- will not be delivered for about a year.

Active primarily in the hardware portion of the market (It does sell some computer memory products and magnetic tape.), RCA is the only company within the top eight that doesn't have an extensive international marketing organization. It relies on crosslicensing agreements with various foreign-based companies, especially Siemens in West Germany. Because RCA still exports some products to Siemens for a name-plate change before delivery. we have counted the Siemens shipments in the RCA totals, even though an increasing portion of these computers are now being built in Europe.

With Siemens included, RCA has an estimated $230 million backlog and therefore should be looking forward to a shipment level in 1970 at best equal to that of 1969. Its estimated computer revenue of $275 million in 1969, however, was only 9% of the corporation's $3.18 billion. Thus, computer activity is only a small portion of RCA's business. This area has been beefed up with former IBM executives, and could show new life; there is concern from some quarters, however, that RCA may gradually phase out of the computer business.

NCR, with a 90% increase in shipments, showed the most growth of any major computer manufacturer. Shipments of $195 million in 1969 brought its share from 1.5% the year before to 2.7%. Most of NCR's shipments were small computers -- the Century 100 and 200 with average purchase values of $120,000 and $350,000 respectively -- and accordingly its share of the number of systems shipped increased from 3% to about 7%. Indeed, NCR took 18% of the Small submarket, mostly at IBM's expense.

After some production problems with the Century's rod memory, NCR appears to be approaching a peak manufacturing level of 100 units a month, and is starting

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up production in Scotland and Germany. There is talk of a larger member of the family (possibly to be called the 300 and have multiprogramming and time-sharing capabilities) as well as a machine even smaller than the 100 (the 50?).

Looking at NCR's prospects for 1970, we calculate a backlog of some $260 million; NCR, therefore, should have another 30% to 40% increase in shipments this year. Estimated revenue from computer activities in 1969 is $175 million, only about 15% of the $1.8 billion corporate total. NCR, however, has apparently begun to realize that its growth potential is much greater with computers than it is with cash registers and accounting machines. To wit, the latest corporate advertising campaign -- in print and on TV -- states very simply: "NCR means computers."

XDS (formerly Scientific Data Systems) had shipments of $75 million, about the same as for 1968 and just over 1% of the overall market. Its Sigma series of computers is entering its fourth year of production so, according to fairly established industry patterns, shipments should peak during 1970. Any significant increases, however, will probably be more affected by marketing changes made by Xerox than by "traditional" patterns. And, at present, the company seems to be undergoing a rather slow process of cross-breeding the engineering-oriented talent from SDS with commercially oriented Xerox personnel.

To meet a planned revenue goal of $450 million by 1974, XDS would have to grow by 30% compounded annually. Such growth has been accomplished by companies in the computer industry, but it seems rather ambitious for XDS, especially in the face of the overall economic situation and the preliminary EDP/IR estimate that its shipments during 1970 will probably at best equal those of 1969. A slight decrease, in fact, seems to be in the cards.

Digital Equipment's computer shipments are split about 50-50 in value between general purpose computers (the time-sharing PDP-10) and dedicated application computers (primarily minicomputers and midicomputers). Its 1969 shipments of $60 million were up 65% from 1968, and DEC increased its share from 0.5% to 0.8%.

Most of the computers built by DEC are sold rather than rented or leased to customers. Thus, to have revenue growth the company must have an increase in shipments each year. It has several arrangements to supply computers, on an OEM basis, that become part of larger systems. Just within the last few weeks, however, DEC seems to be shifting a good portion of its emphasis away from its traditional OEM and scientific-oriented sales, developing software packages that will allow it to vie for a portion of the commercial market. Backlog figures mean very little in forecasting for a company, such as Digital, which can book, build, and deliver a computer in a matter of weeks or months. But with continued good acceptance of the PDP-10, and a minicomputer market expected to grow by 40% to 50% during 1970, the outlook for DEC seems to be good.

Other companies in the mainframe business -- with the exception of Standard Computer Corp., which has prospered primarily on building third-generation computers that are microprogram compatible with IBM 7000 series and other machines -- are those building dedicated application computers, primarily minicomputers. In our current Census of these computers (page 18) we list 44 companies in addition to six of the ten major manufacturers discussed above, and the number continues to grow (EDP/IR Jan.21,1970). The eleven other major companies in this market are Varian, Interdata, Hewlett-Packard, Scientific Engineering Labs, General Automation, Data General, Scientific Computer Control, Computer Automation, Lockheed, Business Information Technology (now called Bit, Inc.), and Raytheon.

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TABLE III

WORLDWIDE COMPUTER MARKET
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
TOTAL				
1969	19,650	89,400	7,170	30.3
1970	25,100	109,800	7,730	36.8
1971	33,800	137,700	8,940	43.8
1972	42,800	173,900	10,300	51.7
1973	50,100	219,100	11,300	60.8
1974	62,200	272,100	13,400	70.8
GENERAL PURPOSE COMPUTERS (GROUP A)				
1969	13,430	70,400	6,740	29.6
1970	15,800	81,700	7,130	35.0
1971	20,500	96,600	8,170	41.2
1972	24,300	114,700	9,360	48.1
1973	28,300	135,600	10,600	56.0
1974	30,100	157,500	12,000	64.8
DEDICATED APPLICATION COMPUTERS (GROUP B)				
1969	6,220	19,000	430	1.24
1970	9,300	28,100	590	1.86
1971	13,300	41,100	770	2.60
1972	18,500	59,200	980	3.58
1973	24,800	83,500	1,180	4.76
1974	32,100	114,600	1,370	6.03

TABLE III (above) is a grand summary of 1969 computer system shipments, with projections through 1974, for all computers manufactured by U.S.-based manufacturers. These figures include equipment manufactured abroad by U.S. companies, the output from GE's international operations that include Bull-GE and GE Information Systems Italia, and all Siemens shipments of RCA's Spectra series — whether manufactured in the U.S. by RCA or in Germany by Siemens.

This is the first Review and Forecast issue in which EDP/IR has identified and projected the market for both General Purpose (Group A) and Dedicated Application (Group B) computers. The latter are becoming a major factor in terms of numbers of computers shipped, but are relatively less important in terms of value. As the table shows, the lower-priced Group B computers will account for about half the number of computers shipped by U.S.-based companies in 1974, but during the same five-year period, the value of Group B computers will grow only from 6% to 10% of the total value of systems shipped each year.

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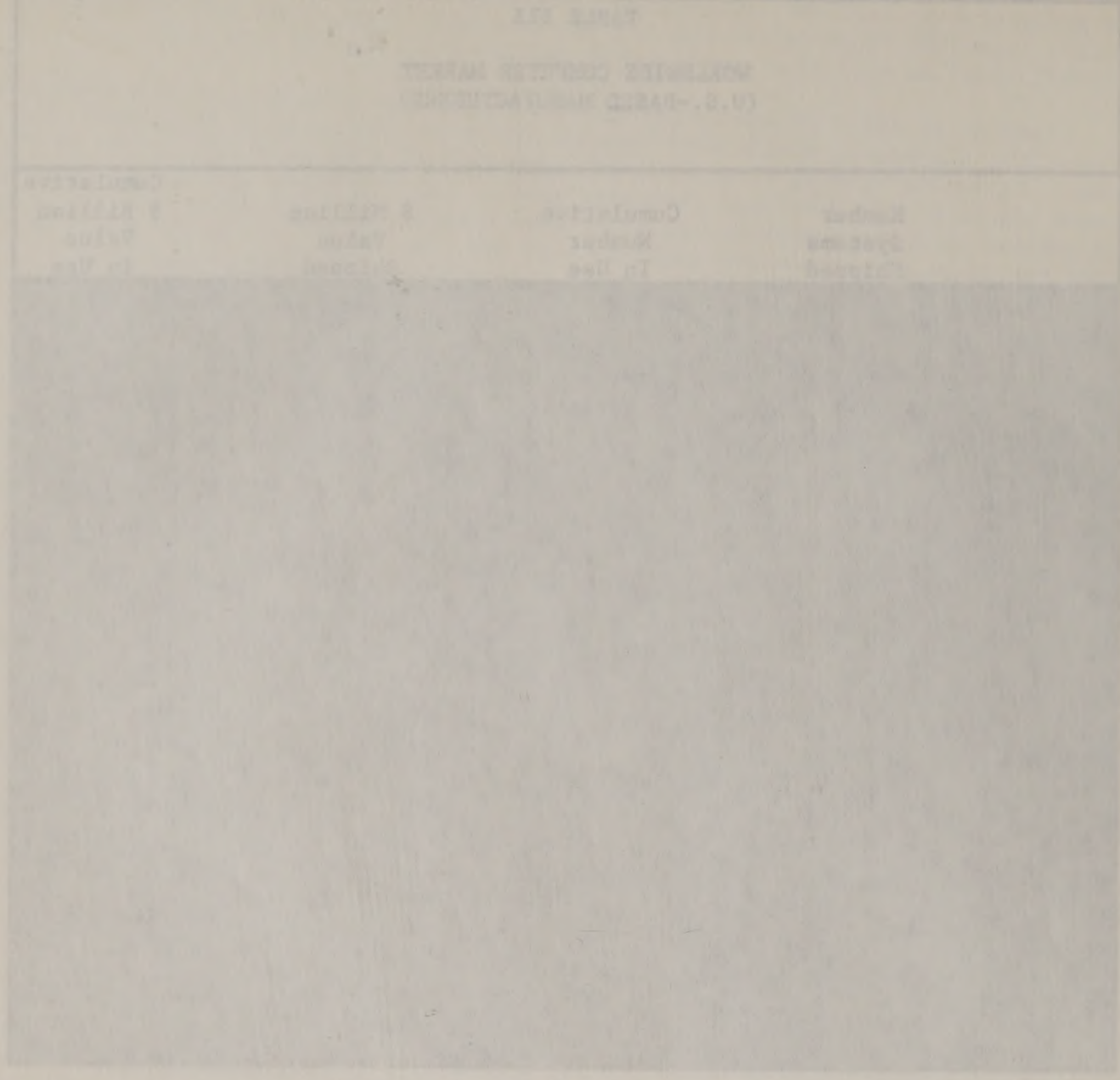

TABLE IV

GENERAL PURPOSE COMPUTER MARKET (GROUP A)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
		WORLDWIDE		
[illegible]	[illegible]	[illegible]	[illegible]	29.6
[illegible]	[illegible]	[illegible]	[illegible]	35.0
[illegible]	[illegible]	[illegible]	[illegible]	41.2
[illegible]	[illegible]	[illegible]	[illegible]	48.1
[illegible]	[illegible]	[illegible]	[illegible]	56.0
[illegible]	[illegible]	[illegible]	[illegible]	64.8
		UNITED STATES		
[illegible]	[illegible]	[illegible]	[illegible]	20.9
[illegible]	[illegible]	[illegible]	[illegible]	24.3
[illegible]	[illegible]	[illegible]	[illegible]	28.2
[illegible]	[illegible]	[illegible]	[illegible]	32.5
[illegible]	[illegible]	[illegible]	[illegible]	37.4
[illegible]	[illegible]	[illegible]	[illegible]	42.9
		[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	8.7
[illegible]	[illegible]	[illegible]	[illegible]	10.7
[illegible]	[illegible]	[illegible]	[illegible]	13.0
[illegible]	[illegible]	[illegible]	[illegible]	15.6
[illegible]	[illegible]	[illegible]	[illegible]	18.6
[illegible]	[illegible]	[illegible]	[illegible]	21.9

TABLE IV (above) gives a more detailed analysis of EDP/IR's projections of the General Purpose (Group A) computer market for U.S.-based manufacturers. This market is broken down into its domestic and international segments. As can be seen, worldwide shipments will rise slightly during 1970 because of the maturity of third-generation product lines and the current economic slowdown. After that, growth rates will pick up. The growth rate for number of systems shipped will increase in 1971 to 30%, due primarily to large shipments of IBM's System/3; measured in terms of value, however, computer shipments for Group A machines will grow steadily at 12% to 15% a year after 1970.

U.S.-based manufacturers are now delivering about one-third of their computers, by value, to international users. And, over the next five years, the international portion of general-purpose systems in use will increase from 29% to 34%. This contrasts to a nearly constant share of dedicated application computers built by U.S.-based companies and installed outside the U.S.

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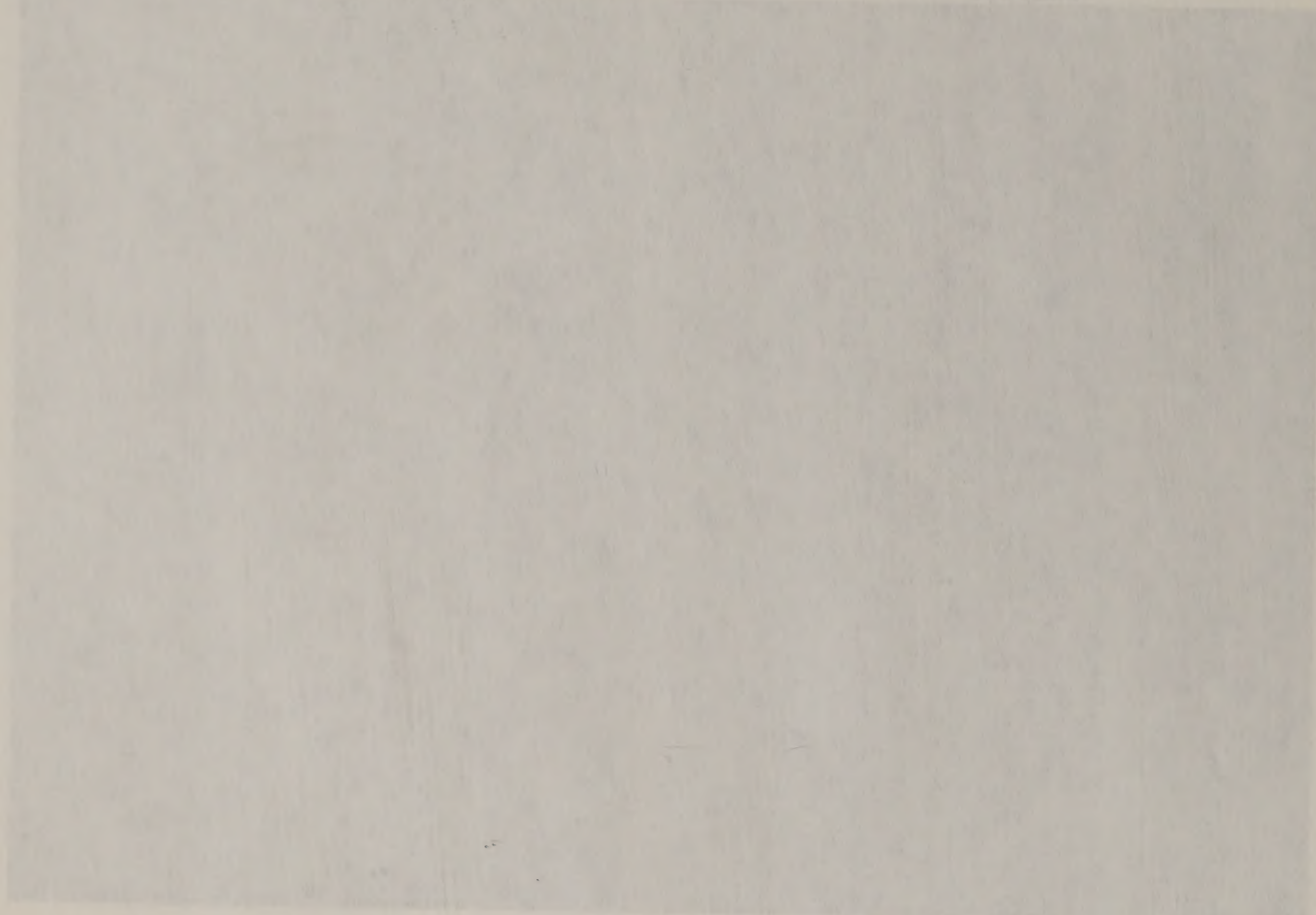

TABLE V

DEDICATED APPLICATION COMPUTER MARKET (GROUP B)
(U.S.-BASED MANUFACTURERS)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Million Value In Use
[redacted]				

TABLE V (above) gives a more detailed analysis of EDP/IR's projections of the Dedicated Application (Group B) computers, first broken out last fall. Computers in this class are minicomputers as well as some larger systems used for specific applications. Some computers in this group were previously accounted for as general-purpose or special-purpose computers; many are included here for the first time.

Growth of Group B computers will be rapid by the numbers. As the table shows, the value of these computers in use will increase nearly five times by 1974; the numbers in use will grow even more, indicating the declining price of these systems. The relationship between domestic and international use of these computers made by U.S.-based companies will remain fairly constant. A comparison of this table with Table IV will show that the international market is becoming more and more important to U.S.-based manufacturers for their general-purpose systems, but that the international share of Group B business will remain just below 20%. One reason for this is that foreign companies already are fairly active in this market.

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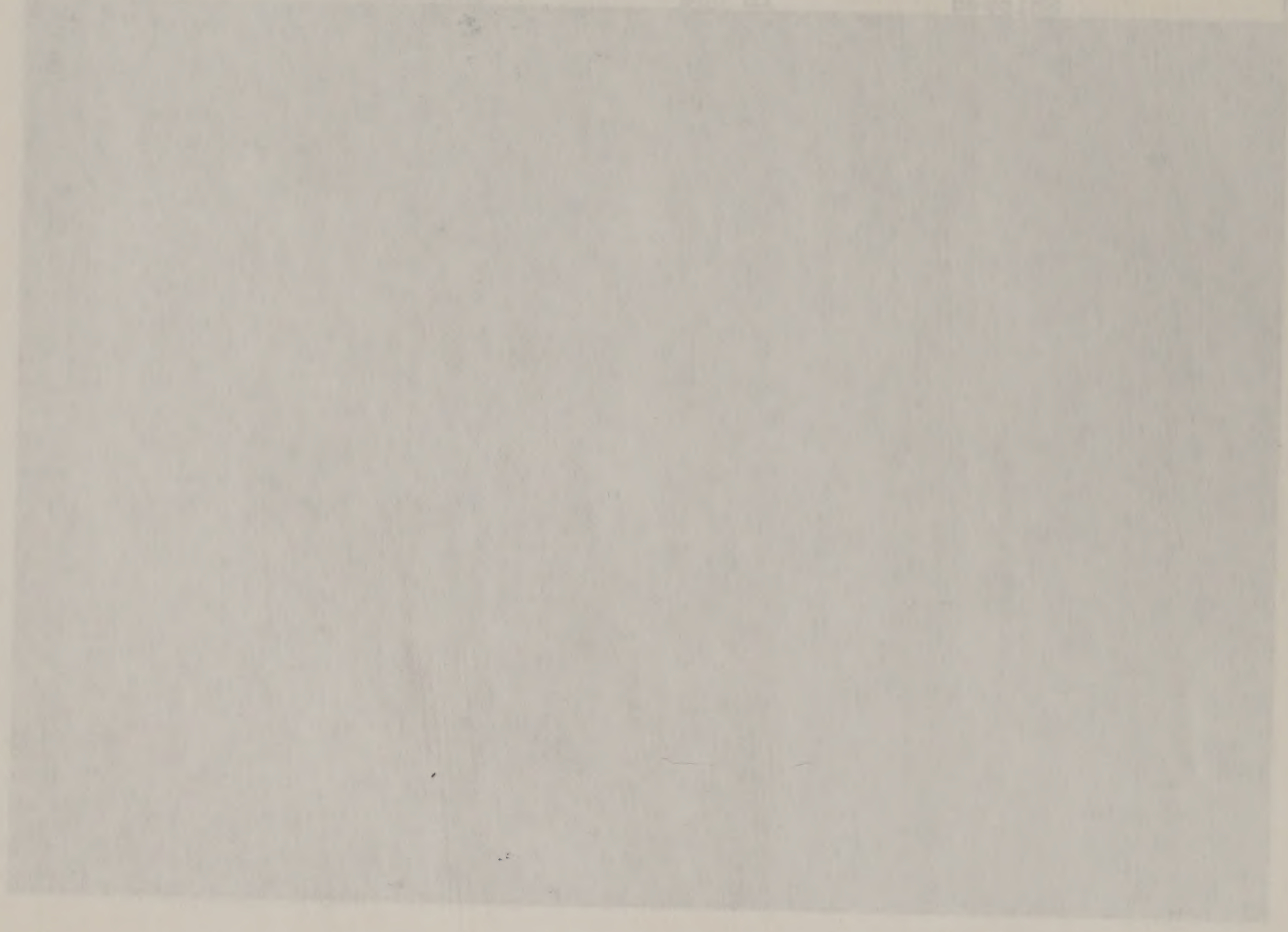

TABLE VI

HISTORICAL REVIEW OF WORLDWIDE COMPUTER ACTIVITY
BY U.S.-BASED MANUFACTURERS
(Values, in $Millions, calculated as new purchase price)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
1955	150	250	65	0.18
1956	600	800	170	0.36
1957	1,000	1,700	280	0.60
1958	1,460	2,950	460	1.03
1959	1,700	4,500	600	1.60
1960	2,200	6,500	720	2.27
1961	2,400	9,300	1,100	3.26
1962	4,500	12,600	1,400	4.51
1963	5,600	16,800	1,710	5.97
1964	7,500	24,000	2,200	7.92
1965	7,400	31,000	2,400	10.1
1966	10,200	40,600	3,660	13.5
1967	16,300	57,600	5,900	18.9
1968	14,700	69,400	7,150	24.6

TABLE VI (above) is repeated just as it appeared in last year's Review and Forecast issue; likewise, across the page, the above figures are broken down into their U.S. and international components. All these figures for past shipments and installations are presented here so that the reader, at a glance, can relate the previous fourteen years of computer industry activity to the next ten.

It should be remembered, however, that with the Census changes introduced in the Nov. 28, 1969 issue of EDP/IR, the former totals cannot be directly compared to current projections. The new Census (see pages 16 through 19) consists of General Purpose Computers (Group A) and Dedicated Application Computers (Group B). These two portions of EDP/IR's Computer Census include all computers included in the previous Census plus a number of Group B machines (primarily minicomputers) that were not previously reported.

This change in reporting has had relatively little effect on the value of computers installed -- only about $250 million worth of computers would be added to the almost $25 billion reported in use at yearend 1968. In other words, the 1968 worldwide total for all computers produced by U.S. suppliers was understated by about 1%, well within the margin for error. In terms of numbers of computers, however, the story is different. Minicomputers (included in the Group B totals) are being shipped at a rapid rate, and the previous technique would leave some 10,000 small computers not accounted for at yearend 1969.

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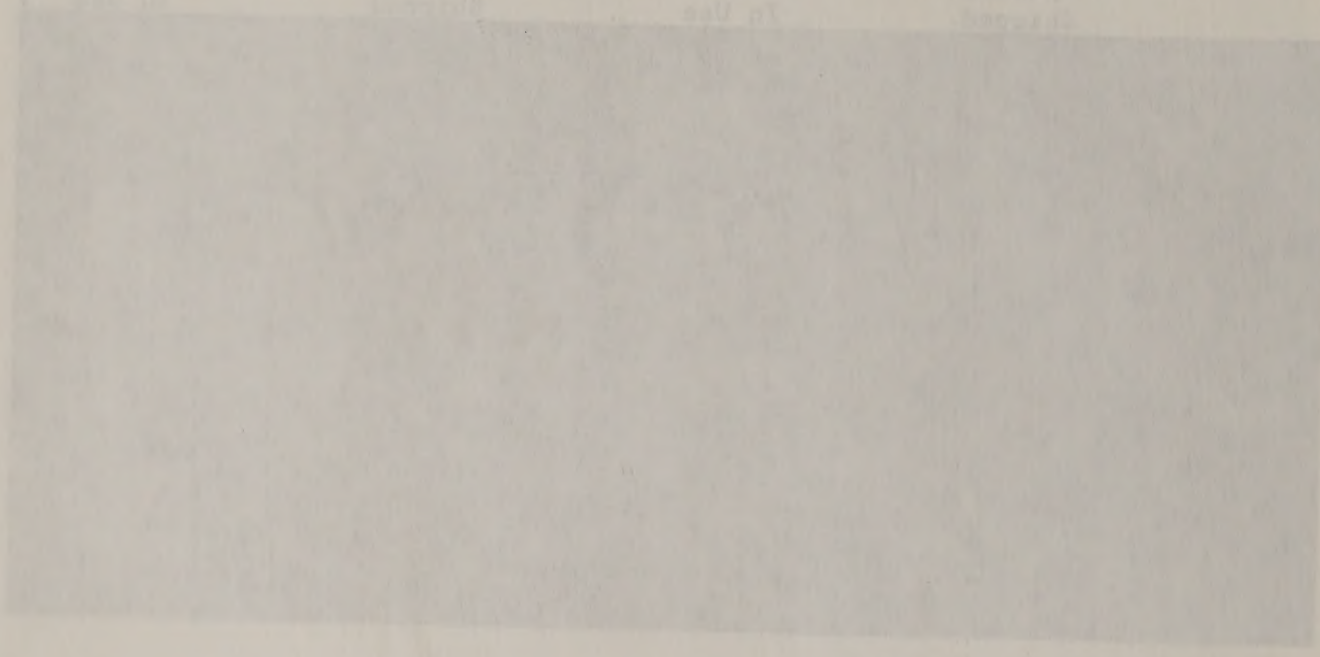

TABLE VI (Cont.)

HISTORICAL REVIEW OF COMPUTER ACTIVITY
BY U.S.-BASED MANUFACTURERS
(Values, in $ Millions, calculated as new purchase price)

	Number Systems Shipped	Cumulative Number In Use	$ Million Value Shipped	Cumulative $ Billion Value In Use
UNITED STATES COMPUTER MARKET				
1955	145	244	63	0.18
1956	550	745	155	0.32
1957	850	1,500	240	0.55
1958	1,180	2,550	395	0.92
1959	1,395	3,810	495	1.39
1960	1,790	5,400	590	1.94
1961	2,300	7,550	880	2.71
1962	3,470	9,900	1,090	3.62
1963	4,200	12,850	1,300	4.72
1964	5,600	18,200	1,670	6.10
1965	5,350	23,200	1,770	7.65
1966	7,250	29,800	2,640	10.00
1967	11,200	40,100	3,900	13.60
1968	9,300	47,100	4,350	17.35
INTERNATIONAL COMPUTER MARKET				
1955	5	6	2	-
1956	50	55	14	0.02
1957	150	200	40	0.05
1958	220	400	65	0.11
1959	305	690	105	0.21
1960	410	1,100	130	0.33
1961	700	1,750	220	0.55
1962	1,030	2,700	310	0.89
1963	1,400	3,950	410	1.25
1964	1,900	5,800	530	1.81
1965	2,050	7,800	630	2.45
1966	2,950	10,800	1,020	3.47
1967	7,500	17,500	2,000	5.30
1968	5,600	22,300	2,200	7.25

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GENERAL PURPOSE COMPUTER CENSUS

These counts for General Purpose Digital Computers (Group A) are based on the best information available to the International Data Corporation, but are estimates only. As a rule, manufacturers in the computer industry do not supply this type of information. It is only through the use of IDC's extensive data files that such estimates are possible. Computers included in "Group A" comprise the bulk of digital computers. They are byte or character oriented, with the exception of large-scale scientific machines, and are programmed by users primarily with the higher-level languages. In addition, EDP/IR publishes a Census for Dedicated Application Digital Computers (Group B), primarily the minicomputers and midicomputers. Note that these figures are not directly comparable to Census counts published in EDP Industry Report prior to November 28, 1969.

AS OF JANUARY 1, 1970

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	205	$ 4,600	1/54	6	13	19	X
	220	$ 14,000	10/58	14	2	16	X
	B100 Series	$ 3,300	8/64	55	6	61	X
	B200 Series	$ 6,500	11/61	340	140	480	X
	B300 Series	$ 8,000	7/65	595	83	678	40
	B500	$ 3,800	11/68	153	135	288	90
	B2500	$ 6,200.	2/67	130	51	181	90
	B3500	$ 14,000	5/67	211	71	282	140
	B5500	$ 37,500	3/63	129	30	159	12
	B6500	$ 45,000	6/69	4	1	5	66
	B8500	$200,000	4/69	1	1	2	3
	Subtotal			1638	533	2171	441
Control Data Corp.	G-20	$ 19,600	4/61	13	9	22	X
	1604/A	$ 42,000	1/60	34	9	43	X
	3100/3150	$ 10,500	12/64	92	47	139	14
	3200	$ 14,000	5/64	61	30	91	X
	3300	$ 20,500	9/65	120	87	207	36
	3400	$ 23,700	11/64	9	9	18	X
	3500	$ 25,000	1/69	7	7	14	18
	3600	$ 48,000	6/63	28	16	44	X
	3800	$ 53,000	12/65	18	4	22	X
	6400	$ 37,000	5/66	57	16	73	15
	6500	$ 58,000	12/67	9	2	11	3
	6600	$127,000	8/64	63	15	78	11
	7600	$240,000	1/69	2	0	2	6
	Subtotal			513	251	764	103
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	18	3	21	X
	PDP-10	$ 11,000	10/67	89	21	110	26
	Subtotal			107	24	131	26
Electronic Associates	8400	$ 12,000	6/65	21	3	24	1
General Electric	53	$ 1,000	/70	-	-	-	0
	55	$ 1,100	1/66	50	1030	1080	160
	58	$ 1,300	11/69	0	20	20	120
	105	$ 1,350	3/69	40	100	140	150
	115	$ 3,000	4/66	510	920	1430	120
	120	$ 3,600	1/70	-	-	-	80
	130	$ 6,200	10/69	0	30	30	105
	205	$ 2,900	6/64	8	0	8	X
	210	$ 16,000	3/60	32	0	32	X
	215	$ 6,000	9/63	9	2	11	X
	225-255	$ 7,000-$16,300	4/61-10/67	159	18	177	X
	235-265	$10,000-$18,000	4/64-10/65	98	11	109	X
	245-275	$16,700-$21,600	10/69-10/69	6	1	7	10
	405-410	$ 6,700-$10,500	2/68-/70	27	3	30	10
	415-420	$ 7,700-$18,000	5/64- 6/67	278	168	446	5
	425-430	$10,700-$16,700	6/64-/70	83	52	135	2
	435-440	$13,700-$23,800	9/65-/70	28	5	33	3
	615	$ 47,000	6/69	6	1	7	12
	625	$ 62,500	4/65	3	8	11	3
	635	$ 79,000	5/65	70	6	76	16
	645	$ 90,000	7/66	7	0	7	X
	655	$ 90,000	3/71	-	-	-	4
	Subtotal			1414	2375	3789	800
Honeywell	H-110	$ 2,600	9/68	144	44	188	78
	H-120	$ 4,800	1/66	787	229	1016	68
	H-125	$ 7,100	12/67	102	140	242	68
	H-200	$ 7,450	3/64	753	263	1016	X
	H-1200	$ 9,800	2/66	167	68	235	X
	H-1250	$ 12,000	8/68	164	38	202	70
	H-2200	$ 18,700	1/66	132	43	175	25
	H-3200	$ 22,000	2/70	-	-	-	28
	H-4200	$ 26,200	9/68	15	1	16	14
	H-8200	$ 50,000	2/69	9	2	11	12
	632	$ 6,000	12/68	7	3	10	7
	1648	$ 11,000	6/68	15	0	15	11
	H-400	$ 10,600	12/61	51	37	88	X
	H-1400	$ 14,000	1/64	4	6	10	X
	H-800	$ 26,000	12/60	59	14	73	X
	H-1800	$ 46,000	1/64	15	4	19	X
	Subtotal			2424	892	3316	378

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AS OF JANUARY 1, 1970

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System 3	$ 1,400	1/70	-	-	-	4000
	360/20	$ 2,900	12/65	7440	3380	10,820	2200
	360/25	$ 7,500	10/68	1295	295	1590	1800
	360/30	$ 10,500	5/65	8050	3140	11,190	950
	360/40	$ 19,300	4/65	3060	1430	4490	750
	360/44	$ 12,000	7/66	157	67	224	38
	360/50	$ 32,000	8/65	1245	500	1745	350
	360/65	$ 60,000	11/65	570	153	723	230
	360/67	$138,000	6/66	43	10	53	15
	360/75	$ 81,400	1/66	60	21	81	10
	360/85	$155,000	10/69	4	1	5	22
	360/90 Series	$150,000	11/67	15	5	20	2
	360/195	$232,000	3/71	-	-	-	7
	1130	$ 1,700	2/66	3610	1245	4855	700
	305	$ 3.600	12/57	8	12	20	X
	650	$ 4,800	11/54	25	17	42	X
	1401	$ 6,200	9/60	150	1990	4140	X
	1401-G	$ 2,300	5/64	475	106	581	X
	1401-H	$ 1,300	6/67	165	41	206	X
	1410	$ 17,000	11/61	217	143	360	X
	1440	$ 4,100	4/63	1300	780	2080	X
	1460	$ 9,800	10/63	175	66	241	X
	1620	$ 4,000	9/60	755	433	1188	X
	7010	$ 26,000	10/63	50	13	63	X
	7030	$160,000	5/61	6	2	8	X
	704	$ 32,000	12/55	9	1	10	X
	7040	$ 25,000	6/63	40	42	82	X
	7044	$ 36,500	6/63	27	20	47	X
	705	$ 38,000	11/55	22	13	35	X
	7070, 2, 4	$ 27,000	3/60	193	62	255	X
	7080	$ 60,000	8/61	76	2	78	X
	709	$ 40,000	8/58	2	0	2	X
	7090	$ 63,500	11/59	34	28	62	X
	7094 I, II	$ 73,400	9/62	93	7	100	X
	7094 III	$ 79,400	4/64	19	2	21	X
	Subtotal			31,390	14,027	45,417	11,074
NCR	Century 100	$ 2,600	9/68	500	100	600	940
	Century 200	$ 7,700	6/69	100	50	150	310
	304	$ 14,000	1/60	19	3	22	X
	310	$ 2,500	5/61	17	3	20	X
	315	$ 9,000	5/62	375	400	775	X
	315 RMC	$ 12,500	9/65	100	50	150	X
	390	$ 1,000	5/61	375	425	800	X
	500	$ 1,200	10/65	1600	950	2550	100
	Subtotal			3086	1981	5067	1350
Philco	1000	$ 7,000	6/63	13	1	14	X
	210/211	$ 40,000	10/58	12	1	13	X
	212	$ 52,000	1/63	12	1	13	X
	Subtotal			37	3	40	0
RCA	Spectra 70/15	$ 4,500	9/65	65	86	151	33
	Spectra 70/25	$ 7,200	9/65	25	37	62	12
	Spectra 70/35	$ 11,000	1/67	175	166	341	75
	Spectra 70/45	$21,000	11/65	317	113	430	70
	Spectra 70/46	$ 36,000	11/68	36	1	37	20
	Spectra 70/55	$ 35,000	11/66	24	8	32	8
	Spectra 70/60	$ 38,000	9/70	-	-	-	12
	Spectra 70/61	$ 50,000	2/71	-	-	-	6
	301	$ 7,500	2/61	335	225	560	X
	3301	$ 19,000	7/64	80	8	88	X
	501	$ 14,000	6/59	63	2	65	X
	601	$ 35,000	11/62	5	0	5	X
	Subtotal			1125	646	1771	236
Standard Computer Corp.	IC 4000	$ 9,000	9/68	10	0	10	4
	IC 6000	$ 16,000	5/67	9	0	9	X
	IC 7000	$ 17,000	6/69	8	0	8	8
	Subtotal			27	0	27	12
Univac	I & II	$ 25,000	3/51;11/57	17	4	21	X
	III	$ 25,400	8/62	53	37	90	X
	File Computers	$ 15,000	8/56	2	0	2	X
	SS80, 90 & Step	$ 8,000	8/58	110	66	176	X
	418 - I, II	$ 13,700	6/63	82	90	172	X
	418 - III	$ 19,600	7/69	8	3	11	15
	491/2	$ 27,000	12/61	41	25	66	X
	494	$ 41,400	2/66	40	26	66	12
	1004	$ 1,900	2/63	1400	1350	2750	X
	1005	$ 2,550	4/66	760	200	960	X
	1050	$ 8,800	9/63	250	127	377	X
	1103-1105	$ 35,000	12/50	6	0	6	X
	1106	$ 39,900	12/69	1	0	1	10
	1107	$ 57,000	10/62	16	18	34	X
	1108	$ 68,000	9/65	118	66	134	50
	9200	$ 1,700	6/67	1010	496	1506	365
	9300	$ 4,000	9/67	545	394	1139	275
	9400	$ 10,000	5/69	35	20	55	125
	LARC	$135,000	5/60	1	0	1	X
	Subtotal			4495	3122	7617	852
Xerox Data Systems	SDS-940	$ 25,000	4/66	70	9	79	X
	SDS-9300	$ 8,500	11/64	33	8	41	X
	Sigma 5	$ 7,700	8/67	124	30	154	35
	Sigma 7	$ 16,600	12/66	75	21	96	24
	Subtotal			302	68	370	59
			Totals	46,579	23,925	70,504	15,332

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DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

These counts for Dedicated Application General Purpose Computers (Group B) are based on the best information available to the International Data Corporation, and much of the data has been verified by the manufacturers. (Any comments and/or corrections should be reported to Walter Misdom, EDP/IR's census editor.) Group B computers include "mini's" (purchase price below $25,000), "midi's" ($25,000 to $50,000), and certain larger systems usually designed or used for one dedicated application such as process control, data acquisition, etc. These computers are word oriented, usually purchased, and predominantly programmed in assembly language. Since this is the first such Census ever published, there are certain blank fields for which information was not available at press time; any corrections or additions to the entries here will be appreciated.

AS OF JANUARY 1, 1970

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Adage	Ambilog-200	30		173	8/64				X
Autonetics	Recomp-II	40	95	127	11/58	20	5	25	X
	Recomp-III	40	65	94	6/61	7	2	9	X
Bailey Meter	756	25		200	11/65	25	0	25	5
	855	25		250	12/68	10	0	10	9
Beckman Instruments	420	18		98	6/64				X
	82	12	9.7	32	8/67	28	7	35	7
Business Information Technology	480	8	9.7	16.2	12/66	98	0	98	150
	483	8	7.7	15.5	12/69	3	0	3	330
Bunker-Ramo	130	15		90	12/61	160	27	187	X
	133	15		108	6/64	64	9	73	X
	230	15		134	6/63	20	2	22	X
	300			275	1/60	18	5	23	X
	330	29	22	275	12/60	23	5	28	X
	340	29		375	10/63	19	3	22	X
	530	18		300	8/61	18	3	21	X
Clary-Datacomp	404	Var	6.8		/70	-	-	-	100
Computer Automation, Inc.	208	8	6	12.4	6/69	5	0	5	250
	216	16	8	23	7/70	-	-	-	
	808	8	5	11	6/68	70	0	70	
	816	16	9.9	23.6	12/68	35	0	35	
Control Data Corp.	160	12	60	112	5/60	49	11	60	X
	160-A	12	90	225	7/61	200	65	265	X
	160-G	13		536	3/64	35	0	35	X
	924/A	24		430	8/61	26	1	27	X
	1700	16	43	170	5/66	243	61	304	50
	8090	12		96	5/64	116	89	205	X
	8092	8		67	6/64	60	0	60	X
	G-15	29		61	7/55	270	18	288	X
	LPG-21	32		42	12/62	145	13	158	X
	LGP-30	32	49.5	59	9/56	295	49	344	X
	RPC-4000	32	87.5	101	10/60	62	12	74	X
	CSC-46	21		250	/54	10	0	10	X
	CSC-136	25		275	/60	4	1	5	X
	CSC-636	15		300	10/63	13	2	15	X
Computer Logic	CLS-18	18	7.5	19	11/69	3	0	3	
Collins Radio Co.	8400			950	11/62	25	5	30	X
	8500	32		120	1/67	45	12	57	
Data Craft	6024-1	24	53.9	120	5/69	6	0	6	3
	6024-3	24	28.8	56	/70	-	-	-	62
Data General	Nova	16	7.9	12	2/69	225	25	250	800
	Super Nova	16	11.7	16	4/70	-	-	-	200
Data Mate	DM-16	16	14.9	28	10/69	2	0	2	3
	ECP-18	18	13.9	15.1	11/66	20	-	20	1
Digital Electronics	3080-B	25		18	12/64	11	0	11	X
	3080-C	25		31	10/67	1	0	1	
Data Technology	1600	(See CAI-808)							
Decade Computer	70	(See Redcor RC/70)							
Digital Equipment Corp.	PDP-1	18	120	136	11/60	50	2	52	X
	PDP-4	18		74	8/62	40	5	45	X
	PDP-5	12	30	36	9/63	90	10	100	X
	PDP-7	18		66	11/64	124	36	160	X
	PDP-8	12	18.5	24	5/65	1189	255	1444	X
	PDP-8/I	12	12.8	25	3/68	1662	438	2100	600
	PDP-8/L	12	8.5	20	7/68	1955	245	2200	780
	PDP-8/S	12	10	18	9/66	892	124	1016	75
	PDP-9	18	35.0	62	12/66	295	130	425	35
	PDP-9/L	18	19.9	32.6	11/68	33	12	45	30
	PDP-11	16	10.8		4/70	-	-	-	200
	PDP-12	12	27.9	35	4/69	120	30	150	110
	PDP-15	18	16.5	55	1/70	-	-	-	200
	Linc-8	12	38.5	47.5	9/66	108	40	148	X
Dynamic Research	DRC-44	24	35	51.1	12/68				
Electronic Associates, Inc.	640	16	24.5	50	6/67	80	32	112	8
EMR(ASI)	210	21	94	132	4/62	9	0	9	X
	420	42	324	450	6/63	3	0	3	X
	2100	21		143	12/63	8	0	8	X
	6020	24		176	4/65	17	0	17	X
	6040	24		224	7/65	8	3	11	X
	6050	24		360	2/66	15	4	19	X
	6070	24		600	10/65	3	2	5	X
	6120	16	9.9		/70	-	-	-	2
	6130	16		62	10/67	41	8	49	12
General Automation, Inc.	SPC-8	8	5	10	1/68	200	0	200	
	SPC-12	12	5	18	/69				
	SPC-16	16							
	GA-18/30	16	18		7/69				

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NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	PURCHASE PRICE ($1,000) BASIC	AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
General Electric	30	16	13	35	4/69	20	0	20	20
Co., GE/PAC	312	20		200	3/60	27	6	33	X
	412	20		300	7/62	39	8	47	X
	4020	24	78	200	2/67	136	42	178	55
	4040	24		120	8/64	45	20	65	X
	4050	24		280	12/66	23	1	24	X
	4060	24		340	6/65	18	2	20	X
	Datanet-30	18		270	10/63	86	8	94	X
GRI Computer	909	16	5	10	1/70	-	-	-	86
Hewlett-Packard	2000-A	16		90	11/68	65	6	71	25
	2114-A	16	10.4	16	10/68	365	64	429	30
	2114-B	16	8.5	15	11/69	25	5	30	300
	2115-A	16	14.5	26	11/67	233	41	274	25
	2116-A	16	22	32	11/66	85	15	100	X
	2116-B	16	24	40	9/68	350	68	418	150
Honeywell, CCD	116	16		65	4/65	175	30	205	12
	316	16	9.7	28	6/69	150	25	175	175
	416	16	15.7	43	12/68	140	50	190	125
	516	16	23.8	55	6/66	432	88	520	100
	19	19		140	5/61	3	0	3	X
	24	24		200	5/63	84	3	87	X
	124	24		80	3/66	69	33	102	6
	224	24		380	3/65	52	8	60	X
	290	18		175	11/60	10	2	12	X
	610/620	24		180	8/63	22	6	28	X
	H-21	20		63	2/66	41	25	66	X
IBM	1710/1720	6		227	2/62	87	37	124	X
	1800	18		235	2/66	750	245	995	175
	7700	18		300	3/64	3	0	3	X
Information Technology	4900/20	16	9.9						
Interdata, Inc.	2	8	8.9	11	7/68	12	0	12	X
	3	16	9.3	20	5/67	170	0	170	40
	4	16	12.3	28	8/68	90	3	93	50
	15	16	17.3	40	1/69	40	0	40	10
Spiras Systems	65	16	12.4	24	8/69				
Lockheed Electronics Co.	MAC-16	16	11.9	21.6	3/69	65	5	70	200
Micro Systems	800	8	3.2	7	1/69	80	0	80	}
	810	8	6.9	7	1/69	65	5	70	} 550
	812	8	12.5	15	12/69	5	0	5	}
Motorola Instrumentation	MDP-1000	8	6.9	18.9	6/68				
Mini Comp	Multi-Term	16	42.9	89	9/70	-	-	-	0
PDS	1020	16		25	2/64	100	27	127	X
Philco, WDL	1212	12	7.5						
	1216	16							
	1220	20							
	102 (CPS)	32	128	280	11/65				
Raytheon Computer	PB-250	22	33	48	12/60	108	26	134	X
	PB-440	24		140	3/64	16	2	18	X
	PB-520	24		128	10/65	22	3	25	X
	703	16	12.7	20	10/67	135	20	155	11
	704	16	9.9		3/69	0	0	0	3
	706	16	19.0	36	5/69	15	3	18	15
Redcor Corp.	RC-70	16	12.9	29.4	7/68	85	0	85	70
	RC-77			111	1/70	-	-	-	
Rolm Corp.	1601	16	19	28	2/70	-	-	-	25
Sanders	200	16		72	3/69				
Scientific Control Corp.	650	12	14.8	20	5/66	23	0	23	X
	655		15.9	84	10/66	111	0	111	25
	660	24		84	10/65	27	0	27	12
	670	24		108	5/66	1	0	1	X
	4700	16	16.2	72	4/69	13	0	13	79
	DCT-32			12	11/69	0	0	0	3
	DCT-132			29	5/69	23	0	23	509
Spear	Microlinc			56.5					
Systems	810	16	37.5	45	9/65	24	0	24	X
Engineering	810-A	16	18	36	8/66	158	4	162	49
Labs	810-B	16	33.5	48	12/68	59	0	59	17
	840	24	65	80	11/65	3	0	3	X
	840-A	24	60	75	8/66	36	2	38	X
	840-MP	24	49	64	10/67	26	0	26	5
	86	32		325	5/70	-	-	-	1
	88	32		1000	11/70	-	-	-	0
Tempo Computers	1	16	13.8		9/69	2	0	2	
	1-A	16	24	29.6					
Transistor Electronics	TEC-520		13.8						
Unicomp	Comp-16	16	9.8			0	0	0	
	Comp-18	18				0	0	0	
Varian Data	520 i	8/16	6.0	12.8	9/68	50	0	50	1000
Machines	610	12		14.7	7/64	10	0	10	X
	611/612	12			9/65				X
	620	16		37	11/65	75	0	75	X
	620 i	16	9.9	20	7/67	700	40	740	100
	622 i	18	12	20	10/67	50	10	60	10
	R620 i	16/18	13	25	5/69	25	10	35	50
Viatron	2140	16	47.5		4/70	-	-	-	
	2150	16	94.5		4/70	-	-	-	
Westinghouse	50	14		23.3	8/64				X
Electric Corp. -	250 (S-2)	16		62	9/67				
Prodac	510/580	18		110	6/63				X
	2000	16	10	26.6	8/69				
Xerox Data	92	12		60	4/65	60	5	65	X
	910	24		80	8/62	168	15	183	X
	920	24	11	116	9/62	135	19	154	X
	925	24		120	12/64	20	2	22	X
	930	24		136	6/64	140	19	159	X
	Sigma-2	16		84	12/66	191	52	243	80
	Sigma-3	16	30	104	12/69	2	0	2	
	CE-16	16	8	12.6	6/69				
	CF-16	16	14.9	25	9/69				
					Totals	16,106	2,918	19,024	8,220

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	1969-1970 High	1969-1970 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	85	47 3/4	1645	53 1/4	47 3/4	51 1/8	+ 1 1/8	+ 2.3
American R & D	99 1/2	44	2551	95 3/4	85 3/8	95 1/4	+ 7 1/4	+ 8.2
Ampex Corp.	49 7/8	32 1/2	1980	42 3/8	38 5/8	41 1/8	+ 3 1/8	+ 8.2
Bunker Ramo	17 5/8	9 1/2	2409	13 3/4	11 1/4	13	+ 1 3/8	+ 8.9
Burroughs	172 3/4	120 3/4	3055	158 7/8	143	154 1/2	--	--
Collins Radio	69 3/4	23 1/4	1051	27 1/8	23 1/4	23 1/4	- 1 3/4	- 7.0
Computer Sciences	34 3/4	19 1/2	9727	30 3/4	23 1/2	24 3/8	- 3 7/8	-13.8
Control Data	159 1/4	60 3/4	9072	75 1/2	60 3/4	66 1/4	- 6 3/4	- 9.3
Electronic Assoc.	25 1/4	8	333	9 1/4	8	8	- 3/4	- 8.6
General Electric	98 1/4	68 1/4	4776	73 7/8	68 1/4	68 7/8	- 3 1/2	- 4.8
Honeywell	157 1/4	107 3/4	1663	140 1/4	129 1/4	134 1/2	- 2	- 1.5
IBM	387	291 3/4	3508	355	334 3/4	349	+13 3/4	+ 4.2
ITT	60 1/2	46 1/4	4258	57 7/8	54 5/8	56 1/4	+ 1 1/2	+ 2.7
Leasco	54	19	1628	22 1/2	19 1/2	19 1/2	- 1/4	- 1.3
Litton	74 1/2	24 3/8	5312	30 1/4	25 1/2	29	+ 4	+16.0
Memorex	173 7/8	65	7664	149	106 1/2	129 1/2	-15	-10.4
National Cash Register	171 3/4	108	1931	148 3/4	135 3/4	146 1/2	+10 1/2	+ 7.7
Planning Research	53 1/4	23 7/8	1156	48 1/2	42 1/2	47 3/4	+ 4 7/8	+11.4
RCA	48 1/8	29 1/4	3769	31 7/8	29 1/4	29 7/8	- 3/8	- 1.1
Raytheon	50 1/4	26 1/2	6151	31	26 7/8	27 3/4	+ 1 1/4	+ 4.7
SCM	47 1/8	18 3/4	996	20 1/4	18 3/4	18 7/8	- 1/4	- 1.3
Sanders	61 7/8	20	769	22 7/8	20	20 1/8	- 1 7/8	- 8.5
Sangamo	43 1/2	19 1/4	894	29 1/8	24 3/4	28 1/2	+ 3 1/2	+14.0
Singer	87 7/8	62	1092	80 1/2	75	76 1/8	- 1	- 1.3
Sperry Rand	55 1/2	34 1/4	4452	37 3/8	34 1/4	34 1/2	+ 1/8	+ 0.4
Teledyne	45 1/2	25	4554	29 5/8	25	26 1/4	- 2 3/8	- 8.3
Telex	159 1/2	20 3/4	12873	146 3/4	106	135	- 6 3/4	- 4.8
University Computing	111 1/2	53 1/4	4512	65 7/8	53 1/4	62 7/8	+ 5/8	+ 1.0
Xerox	115 3/4	85 1/4	5183	104 7/8	97 1/8	97 3/4	- 2 7/8	- 2.9
NYSE COMPUTER STOCK AVERAGE							+ 0.1	+ 0.2
AMERICAN STOCK EXCHANGE								
Applied Data Research	32 7/8	17 1/2	204	20 1/2	17 1/2	17 1/2	- 3	-14.6
Automatic DP	47 3/4	34 1/8	1816	46	40 3/4	45 3/8	+ 2 1/8	+ 4.9
Calcomp	37 1/2	18 1/4	920	28 3/4	23 1/4	28 3/8	+ 5 1/8	+22.0
Clary Corp.	25 3/4	7 7/8	118	8 7/8	8 1/8	8 1/8	- 1/8	- 1.5
Computer Applications	21 7/8	6	362	9	7 1/4	8 1/8	+ 5/8	+ 8.3
Computing and Software	75 3/4	37	887	73 1/2	66 1/8	68 1/2	- 1/8	- 0.2
DPA, Inc.	13 5/8	7 3/4	217	8 1/2	7 3/4	7 3/4	- 1/4	- 3.1
Data Proc. Fin. & Gen.	60 1/4	22	1137	24 7/8	22 1/4	22 7/8	+ 5/8	+ 2.8
Data Products	27 7/8	12 3/8	2480	22	19 3/8	20 3/4	+ 1	+ 5.1
Digital Equipment	124	54 1/2	1730	123 1/2	109	121 7/8	+ 9 7/8	+ 8.6
Granite Mgt.	45 1/2	14 1/4	253	18	14 3/4	16 1/8	+ 1 7/8	+14.2
Greyhound Computer	28 5/8	11 1/2	175	12 3/8	11 1/2	11 5/8	+ 1/8	+ 1.1
ITEL	37 5/8	14 1/4	1034	21 3/8	18 3/4	20 1/8	+ 3/4	+ 3.9
Levin-Townsend Comp.	57 1/2	10	1146	14 3/8	10	11 1/8	- 1 1/4	-10.1
Milgo Elect.	84 1/2	17 7/8	7611	78 1/2	64 1/8	71 1/2	- 1 3/8	- 1.9
Mohawk Data Sciences	89 1/8	59 3/4	3432	79 1/2	68 1/2	76 7/8	+ 1 7/8	+ 2.5
Potter Instrument	46	23 3/4	1623	36 1/8	30	35 3/8	+ 4 5/8	+15.0
Sys. Eng. Labs.	53 7/8	26 1/8	1627	44 7/8	38 1/2	43 1/4	+ 4	+10.2
AMSE COMPUTER STOCK AVERAGE							+ 1.5	+ 3.7

	1969-1970 High Bid	1969-1970 Low Bid	February 13, Bid	February 13, Asked	2 weeks ago Bid	2 week net change Bid	2 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	19	3 5/8	4 1/4	5	3 5/8	+ 5/8	+ 8.9
Bolt, Beranek & Newman, Inc.	19	7 1/2	9 3/4	10 1/2	8 1/2	+ 1 1/4	+11.9
Computer Usage	40	5 1/4	7	7 3/4	6	+ 1	+13.8
Cyber-tronics	15	7	13	13 3/4	12 3/4	+ 1/4	+ 1.7
Digitronics	22 1/2	12 1/2	12 3/4	13 3/4	13	- 1/4	- 2.0
Fabri-Tek	12 7/8	5 5/8	7	7 1/2	6 1/2	+ 1/2	+ 6.1
Informatics, Inc.	30 1/4	11 3/4	15 1/4	16	16	- 3/4	- 3.9
LMC Data, Inc.	8 1/4	1 3/4	2 5/8	3 1/8	2 3/4	- 1/8	- 3.9
Management Assistance	14 7/8	2 1/8	3 3/8	3 5/8	3	+ 3/8	+10.4
Optical Scanning Corp.	118	40	46	49	40	+ 6	+11.8
Recognition Equipment, Inc.	83 1/2	52	71	72	66 1/2	+ 4 1/2	+ 5.4
TBS Computer Centers Corp.	36	11	24	25	23 1/2	+ 1/2	+ 2.4
Tally Corp.	36	15	19	20 1/2	18 1/2	+ 1/2	+ 2.6

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EDP industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MARCH 30,1970 • VOL.5,NO.10 P.J.McGOVERN,EDITOR

RCA gives the customer his choice

IBM EXTENDS UNBUNDLING THROUGHOUT MOST OF WORLD AS U.S. USERS STILL STALL ON EXTRA SPENDING AND EXPRESS LITTLE CONCERN

Nine months after it announced its "new way of doing business" in the U.S. and Canada, IBM on March 25 revealed that it was gradually extending its policy of separate pricing to most of the rest of the world. The announcement comes at a time when most people who watch the computer industry are still trying to figure out the eventual effect of unbundling, and while U.S. users, by and large, are scratching their heads still trying to figure out what it will mean to them.

Most of the other mainframe manufacturers reacted to IBM's June 23, 1969 announcement during the latter part of last year, telling of plans either to remain bundled or to adapt some form of unbundling (EDP/IR Nov.7,1969). Indeed, RCA was the only major manufacturer that hadn't revealed a decision until last week when it announced "the computer industry's first plan with options to bundle or 'unbundle,'" essentially dumping much of the decision smack into the user's lap.

But many users don't know exactly what they want, much less how much of it they need . . . and this doesn't seem to bother them.

During the past month or so, EDP Industry Report has talked to IBM users of just about every size computer, within almost every major industry, at locations across the country. We found that a surprising number of them seem to have an "I don't care and I'm not really concerned" attitude. And, since it would be hard to believe that IBM salesmen haven't been closely in contact with their customers, it would appear that the sales pitch in general has been a very soft sell . . . almost a holding pattern until customers come running. For example:

- If nothing else, IBM customers recognized a need for education, and many of them doubled up on training before the pricetag went on. Now, courses are priced but attendance has been rather low. Few independents have entered the market and IBM is using its educational centers to further train systems engineers that otherwise would be idle.

- And there are many reports of idle SEs, with current demand quite low according to our survey. But IBM says its billings for SE services are running as planned or better. Thus, it must follow that IBM had planned a rather gradual startup in billings for systems engineers. Of perhaps more than passing interest is the fact that systems engineering and education now are under the same operational control.

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- IBM has announced a few separately priced program products primarily pointed at particular industries or designed for very specialized applications. Also, quite a few of the independent companies in the packaged software business have been touting their wares. IBM really hasn't pushed its products, and says it is busy perfecting them. Interestingly, it compares them to read-only emulators, the programs in a box sometimes referred to as firmware.

- There is considerable enthusiasm within IBM over the prospects for its Custom Contract Services, and about a week ago a significant contract under which IBM will design a specialized system was announced by American National Insurance Co. of Galveston, Texas. Covering three years and probably running up a bill for some $5 million (plus equipment), the package calls for a "company-wide total information data processing system to serve every level of need." If it is successful, the system devised under this contract could be important for IBM in working with other insurance companies.

In general, then, the computer industry seems settled into a period of waiting which is difficult to figure out. In addition to unbundling, a feeling of economic uncertainty hangs over the country and many users have a sense of complacency because they are working with equipment that has mature status, not exciting possibilities. There are still a lot of questions.

In the remainder of this report, EDP/IR will give a rundown on the recent unbundling announcements, a summary of the latest attitudes and trends reported by IBM users, and our estimates of the effect of unbundling on IBM's revenue for 1970. Based on this, readers should better be able to assess the short-term outlook for both IBM and an unbundled computer industry.

IBM MOVES TOWARD SEPARATE PRICING OUTSIDE THE U.S. AND CANADA

> The IBM companies making these announcements are convinced that the trend of the industry is toward more complex installations, such as real-time and remote terminal-oriented operations. Implementation of the new practices, therefore, will benefit both the industry and users of data processing equipment.
>
> The new practices will offer users an opportunity to choose the type and quantity of support services they require. They will also enable IBM to offer more in-depth assistance to customers in the installation and application of their data processing systems and to structure IBM's services to each customer's individual requirements.

The above "Study Conclusions" come from IBM Corp.'s press release describing the "new data processing business practices" for IBM companies in 15 European countries, and Australia, New Zealand, and South Africa. Within Europe, IBM says that it will offer for a price all systems, products, professional courses, and program products announced after March 25, 1970; in Australia, New Zealand, and South Africa, the separate pricing structure is to be much like that now in effect in the U.S., with the exception that "presently available education courses other than [for]System/3 will continue to be available for specified periods without charge."

Within Western Europe, IBM says that currently announced systems "should" continue to be marketed in generally the same manner as in the past "because of gov-

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ernment regulations and procurement practices." This is an interim or transition arrangement, however: "For IBM customers in the 15 European countries, the new practices are scheduled to be effective July 1, 1972, for all systems and products."

RCA GIVES USERS AN UNBUNDLED OPTION ON ITS NEWER SYSTEMS

RCA Corp. recently announced what it called "major changes in its computer pricing structure;" the plan it described, however, seems more like a marketing move that allows salesmen to give customers a three per cent price break if they will do without or pay separately for systems engineering. The announcement says:

> Basic operating software, applications programs, and customer training services -- other items in contracts involving computer systems -- will continue to be provided by RCA at no extra cost under whichever option the customer elects to take. [The RCA plan] offers the nation's computer users a price reduction equal to that offered by IBM on unbundled computers while still giving them the option of taking the total hardware and software package at no increase in price.

The new pricing structure is only for what RCA calls its "latest computer models" -- the larger Spectra 70/46, 70/60, and 70/61, the latter two of which have yet to be delivered to customers.

In addition to the unbundled option, RCA also announced that it would offer commercial customers a new lease-purchase plan. Customers who sign up for this would receive up to a 15% reduction in monthly charges over a six-year period, at the end of which they would own the computers. This plan applies also to computers from RCA's Graphic Systems Division, which supplies electronic composition systems for use in printing and documentation.

RCA and some other computer manufacturers have offered similar contracts to state and local government agencies for several years. But this, says RCA, is the first time that any major manufacturer has made these terms available to non-government customers. In making the announcement, RCA's top computer executive -- L.E. Donegan, Jr., who moved to RCA from IBM -- said that his company's objective "is to be the computer company that is the easiest to do business with."

IBM'S UNBUNDLED SERVICES AND HOW USERS ARE REACTING

As mentioned earlier, ever since IBM made its unbundling announcement -- and especially since the beginning of this year when all the separate pricing provisions went into effect in the U.S. -- the most-asked question in the computer industry has been: "What will be the effect of unbundling . . . on IBM, and on the computer industry?"

In an attempt to answer this question thoughtfully, EDP/IR has asked IBM users to describe their reactions; we have talked to independent companies, mainframe manufacturers, and officials of IBM's Data Processing Division; and we have made an extensive analysis of the data base maintained by our publisher, the International Data Corporation. We estimate that IBM this year will receive a total of about $375 million in new revenues from unbundling, offset somewhat by about $85 million from the 3% price reduction on hardware. The amount of the increase could be as much as $100 million less, depending on customer reaction to new program products and their use of systems engineering time later in this year. Here is a rundown on the current situation, by pricing area:

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Thumbs up for education; systems engineering down

As more and more reports are analyzed, IBM's decision to combine systems engineering and education under one profit center looks increasingly like the sort of reasoned planning one expects from IBM. The particular area where IBM customers think they will continue to require assistance is education; the place where they seem willing to spend relatively less is systems engineering.

Naturally, this generality doesn't apply to every case, even among users of about the same type of data processing equipment, but the size of a user's installation is an important consideration. In general, the small (single 360/30 or below) user is postponing costs. He has his installation up and going, and therefore won't need much SE assistance until or unless he begins to implement a major new application. In many cases, this would require the consideration of additional equipment, with the associated SE support and education.

Otherwise, the small user will be postponing his educational requirements, as well. Most of these IBM customers feel that their training requirements are satisfied for the present. A few of them say they will take a look at independent offerings or try in-house training when the need arises, but the majority say they will likely stay with IBM. The general feeling seems to be that if education is going to be paid for, the equipment manufacturer knows the system best and probably should be selected.

This last attitude is reflected by most of the larger users, also. They report they will probably cut back on the amount of education they pay for in the future, and we can't help but wonder whether some personnel were previously sent to school as some sort of bonus as long as it was free. There will definitely be more in-house and on-the-job training, and a good market for independents who design in-house training programs and teaching aids could develop. On the other hand, outside independent training operations so far have generally been looked down on, and IBM's classrooms will probably continue to stay reasonably full.

Some SEs, in fact, could end up teaching rather than consulting. There is definitely an across-the-board cutback in the use of systems engineers. No small users in our sample had yet called on IBM for an SE. The larger users are paying for SE support, but sparingly. The one interesting trend -- so far -- is that in general the larger installation a customer has the more likely he is to use some SE services. This trend will likely continue, with smaller installations asking for some SE assistance at least when new equipment or applications are installed.

From IBM's point of view, much of the user reaction would appear to have been anticipated. The company considers 1970 a start-up year for educational activity and for the sale of SE time. Also, IBM reports that it is beginning to work out some fixed-price systems engineering packages and that it will definitely work out with customers individualized confidentiality agreements. Some prior concern had been expressed in this area.

To calculate IBM's possible revenue from systems engineering this year, we started with the estimate of 11,000 SEs employed by IBM and assumed that about 30% of them will be tied up in pre-sale marketing activities, and the remainder would be billable about 60% of the time. This technique leads to an estimate of about $185 million in billable SE services. IBM's educational courses currently average about $300 each. If five to six people per site (the average) need two courses, IBM can expect between $40 million and $50 million revenue from training.

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There may not be quite the demand assumed above, but the figures give an idea of the factors involved. And despite negative reports about customer acceptance of education and systems engineering, IBM seems satisfied. Its vice president responsible for these two areas says that the separation of pricing "solves problems for us and . . . I think . . . for our customers. The price puts a discipline on talent -- both that of the customer and that of IBM. Now that everything is on a competitive basis, we want to make sure that the systems engineers and the educational courses are sharper."

Program products -- the opening for independents?

The most dramatic effect of unbundling, to date, seems to be that independent software packages will at least be considered by users from all types of installations. For some of the users, this consideration of independent packages represents a change of policy; for others, it is simply a strengthened tendency to look elsewhere. In any event, the independent firms have sensed this, as a look through the pages of Computerworld, the industry's user newspaper, will prove.

The strongest tendency to look outside, of course, comes from the larger users. And some of these are considering the in-house development of certain packages, perhaps with an eye to their resale in the future. Only one large user we talked to has plans for doing everything in house, however, and this one is a natural exception -- a Bell System operating company.

Among small and medium-sized IBM customers, there are some that are taking very sophisticated approaches -- looking at what IBM has to offer, talking to independents, then making a final decision. Most of them, however, seem uninterested in the entire matter. Some of these simply have no pressing needs at present and appear willing to count on IBM if and when a need arises.

IBM, on the other hand, has been issuing program products at a very slow pace. It says that it intends to give the user more, higher quality products and that it is spending the time and resources necessary to insure quality. Program products are being tested by the same internal organization that tests hardware, and virtually all of them under development are application oriented.

Considering this, and considering that System/360 is a mature product with a large amount of software already operating on user equipment, we suspect that IBM doesn't have grandiose goals for program products. There are just over 26,000 System/360s in the U.S., and if each bought one program product (which average $270 each per month for the first 21 announced), IBM could expect an income this year of $85 million. This level of activity may not be reached during 1970, and for this reason we have given a wide spread -- between $50 million and $125 million -- to our estimate of IBM's income from program products.

There is a real question as to how much effort IBM will spend, at this point in the product's life, on program products for System/360. Indeed, we can easily see how the comparison of these products to read-only emulators may be more than a play on words. In all probability, much of the software for any new line of computers will be in this form -- so-called firmware -- and quite a bit of IBM's development work could already be pointed in this direction.

Hidden potential in custom contract services?

Custom contract services, which IBM announced along with separate pricing last summer, is really a new business for the Data Processing Division. And -- cut from

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and resembling the Federal Systems Division -- it is one which few customers would know about at present. It is, however, a business that may be an important source of income for IBM in the years ahead. We estimate that, during 1970, IBM may get between $25 million and $40 million from its CCS activity.

The CCS organization contracts with a customer to do a specific job. As such, it fits into the service spectrum between consulting (or systems engineering, as IBM labels this service) on the one side and contract programming (which IBM does only through its Service Bureau Corp. subsidiary) on the other. The group definitely "is not a body shop," according to the DPD vice president who heads it. "We manage the design and installation of custom applications . . . and we pretend no objectivity towards hardware!"

IBM would consider tackling a mixed system, but to date it hasn't. In the event it did, the company spokesman says, the system would at least be required to have IBM central processors. Most of the work done by CCS is expected to be for middle-sized and large users, helping them overcome the time problem and peak manpower needed in implementing a new system.

The project for American National, the country's 23rd largest insurance company, is an ideal example of the type work that is planned for CCS, and it is the largest undertaking yet for this group. Being implemented under a three-year contract, the project is called ARTTIS (Advanced Real-Time Total Information System). It is described as a "pioneering system," and sounds as if it will answer the prayers of many insurance company executives across the country.

The system will be a complex of 360/65s, visual display stations, and keyboard communication terminals. American National says that "millions of separate pieces of information -- ranging from premium notices to the status of the company's investments -- will be funneled into a single consolidated operations and management information system." So Arttis, in a real sense, has overtones for the insurance industry that are similar to those of Sabre, pioneered by American Airlines and IBM, for the airline business. From its work on the Sabre System IBM has developed Pars (Passenger Airline Reservation System) . . . and because of this the definite prospect of having several 360/195s acquired by most major airlines.

HAS ANYTHING REALLY CHANGED?

These reports lead to the question: Are IBM users telling us they have attained maturity in their data processing operations? Or, are they simply confirming another round of obedience in IBM's school for the innocent? We certainly would hope for the former . . . for a population of computer professionals who think for themselves. Unfortunately, we suspect the latter.

In just the same way that many people buy on impulse before studying Consumer Reports, the typical IBM user is likely to postpone expenses until he has a need, then call his "corner office." As usual, IBM will be ready to respond . . . and charge for it.

Systems engineering time may be dropped in favor of more emphasis on education, or vice versa; many program products may become boxes; custom services may be better planned than before. But IBM will still offer a full-service shop, and probably will continue its role as the dominant force in the computer industry . . . leading new users into the fraternity and holding high the umbrella for more and more new companies' shelter.

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NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

AT&T

American Telephone and Telegraph Company, 195 Broadway, New York 10007, on February 18, filed $1,569,327,000 of debentures (due 2000), with 31,386,540 common purchase warrants, to be offered for subscription by stockholders. The proceeds will be used for advances to subsidiary and associated companies, for the purchase of stock of such companies, for extensions, additions and improvements to its communications systems, and for general corporate purposes. (AT&T's 1969 construction expenditures were over $5 1/2 billion.) The securities will be marketed through a group headed by Morgan Stanley & Co.

BRADFORD COMPUTER & SYSTEMS

Bradford Computer & Systems, Inc., 1700 Broadway, New York 10019, a computer services company, on February 20, filed 100,000 common to be offered for sale by the company and another 90,000 outstanding common to be offered by present holders. The proceeds from the 100,000 shares, at terms to be set by amendment ($75 max.), will be used for new and expanded services, for further investment in several companies, and for other purposes. The underwriter will be Kidder, Peabody & Co., Inc., 20 Exchange Pl., New York 10005.

MICRODATA CORP.

Microdata Corp., 644 East Young St., Santa Ana, Calif. 92705, a producer of small digital computers, on February 19, filed 400,000 common. The proceeds, at terms to be set by amendment ($13.50 max.), will be used for R&D, marketing (including establishment of sales offices), expansion of facilities, and for general corporate purposes. The underwriter will be Glore Forgan Staats Inc., 833 Wilshire Blv., Los Angeles.

PATH COMPUTER EQUIPMENT INC.

Path Computer Equipment, Inc., 20 Beckley Ave., Stamford, Conn. 06901, a computer peripherals manufacturer, on February 19, filed 400,000 common, to be sold at terms supplied by amendment ($7.50 max.). Part of the proceeds will be used to repay interim financing (the proceeds of which will be used for purchase of equipment and for working capital). The remainder will be used for the manufacture of the company's Path 1200 printer, other product development, capital purchases, marketing, and working capital. The underwriter will be Philips, Appel & Walden, Inc., 111 Broadway, New York.

SIGMA DATA COMPUTING CORP.

Sigma Data Computing Corp., 4720 Montgomery Lane, Bethesda. Md. 20014, a computer software company, on February 16, filed 200,000 common. The proceeds, at a price to be set by amendment ($5 max.) will be used to market and enhance its Inquiry and Reporting System, to expand staff, to develop additional proprietary computer programs, for sales and training offices, and for other corporate purposes. The underwriter will be T. C. Horne & Company, Inc., 2 West 45th St., New York 10036.

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• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 9,1970 • VOL.5,NO.11 P.J.McGOVERN,EDITOR

Many questions remain unanswered

FCC ANNOUNCES TENTATIVE DECISION IN COMPUTER/COMMUNICATIONS INQUIRY; DATA PROCESSING SERVICES TERMED "COMPETITIVE" AND WON'T BE REGULATED

The obituary for Docket 16979 was written into Paragraph 10 of the Tentative Decision just handed down by the Federal Communications Commission:

> . . . since the inception of this Inquiry, major progress has been made and is continuing toward improved and more economical communications services for computer users. These developments also lead us to the conclusion that the questions relating to interconnection or to the need for other improved common carrier service offerings, regulations and practices to serve computer needs, can best be handled through rate, tariff and licensing proceedings that are now pending or that may be initiated in the future, rather than through a continuation of our Inquiry . . .

Thus, after three-and-a-half years (EDP/IR Nov.15,1966), the Inquiry is closed.

> [It] was initiated November 10, 1966, to provide a public forum for the examination, discussion and resolution of a number of regulatory and policy questions that appeared to be emerging from the growing interdependence of computers and communications services and facilities.

In closing the Inquiry, the FCC has left unanswered some sticky questions, and these will likely be buffeted about in lengthy proceedings as individual tariff and license cases are heard. But the FCC does tackle the key question of regulation of data processing and message switching services offered by common carriers and by non-regulated companies:

- Data processing, including remote processing, will not be regulated. Thus, because of the 1956 consent decree, AT&T is locked out of the pure data processing business; but, such services offered by other common carriers will not be tariffed.

- To offer data processing services, however, other common carriers will have to set up separate subsidiaries.

- Systems that have both data processing and message switching get a new name -- hybrid systems -- and will be regulated if, and only if, message switching is the main purpose of the system and data processing is an incidental and integral part of the system.

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So far, so good. But several other questions were raised in the 1966 Notice of Inquiry, a document that launched what, at the time, we suggested could be a "sweeping inquiry into the interrelationships between computers and communications." As a partial answer, the FCC says that good progress has been made toward providing better tariffs, more liberal interconnect rules, and consideration of special service carriers.

On the latter point, in fact, the FCC called "significant" its four-to-three decision that allowed Microwave Communications Inc. to go ahead with its Chicago-St. Louis microwave link (EDP/IR Dec.31,1969). And it mentioned that it is considering the Datran proposal from University Computing. But a spokesman for the Commission says no implied acceptance -- or rejection -- can be read into this.

And on the final untouched issue -- that of privacy -- the FCC says there are "numerous social and public policy implications which go well beyond the pale of our jurisdiction over communications and which have already been the subject of Congressional studies and hearings . . ." It noted that the National Academy of Sciences is conducting an investigation on this subject.

In essence, then, informed experts think the FCC seems to have acknowledged developments in the communications and data processing industries to date as faits acomplis, and that it has hedged in establishing future guidelines. And this is unfortunate. When the FCC instituted the inquiry, it appeared to have dared foresight and an enlightened attitude that is lacking in many regulatory bodies. Now, it seems, the FCC has reverted to the more traditional practice of piecemeal decision-making . . . which may be its only practical approach.

Here lies The Inquiry: 1966-1970

The inquiry "In the Matter of Regulatory and Policy Problems Presented by the Interdependence of Computer and Communication Services and Facilities" was launched during the fall of 1966 . . . back when time sharing was primarily a scientific curiosity and "computer utility" was an academic concept rather than an advertising slogan. It was beautifully timed.

And interest in this area was high. Sixty-one organizations -- including major companies and associations in the data processing industry, carriers and manufacturers of communications equipment, commercial users of data systems, governmental groups including the Department of Justice, and others -- submitted more than 3000 pages of material to the FCC.

In March of 1968, the Commission contracted with Stanford Research Institute (SRI) to evaluate the responses and submit recommendations. A year later SRI delivered its results to the FCC: The responses were digested into only 430 pages, and an additional 400 pages were added. Quite quickly, then -- by May 1, 1969 -- the FCC adopted a Report and Further Notice, 21 interested parties responded, and the record was closed on July 24, 1969. On April 2, 1970, the Tentative Decision was released and interested parties have until May 13 to file comments.

The three-and-a-half years consumed by this process may have been necessary . . . many organizations, varied interests, and complex questions are involved. But technology doesn't stand idle for learned debates and analyses.

So we are forced to question the method adopted for carrying out the Inquiry. The need for such an Inquiry was apparent, and it was well presented in the orig-

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DEFINITIONS OF SPECIFIC TERMS

In its Tentative Decision, the FCC says that before any issues can be resolved, it is "necessary to define as precisely as possible the terms we shall employ." It continues with the understatement that "in this highly technical and rapidly growing industry, new terms, many of which may overlap in meaning, have proliferated," and that "we need to establish definitions that are as free from ambiguity as language permits." Presented below are "basic" terms which the FCC considers "indispensable to our objective of providing clarity and precision of definition and application:"

- Data Processing -- The use of a computer for the processing of information as distinguished from circuit or message-switching. "Processing" involves the use of the computer for operations which include, [among other things], the functions of storing, retrieving, sorting, merging and calculating data, according to programmed instructions.

- Message-switching -- The computer-controlled transmission of messages, between two or more points, via communications facilities, wherein the content of the message remains unaltered.*

- Local Data Processing Service -- An offering of data processing wherein communications facilities are not involved in serving the customer.

- Remote Access Data Processing Service -- An offering of data processing wherein communications facilities, linking a central computer to remote customer terminals, provide a vehicle for the transmission of data between such computer and customer terminals.

- Hybrid Service -- An offering of service which combines Remote Access data processing and message-switching to form a single integrated service.

** In a rather long footnote, the FCC points out how message-switching should be distinguished from circuit switching even though "both functions involve the interconnection or transfer of electric signals from one channel to another." Historically, says the FCC, message-switching, typified by the telegraph industry, involved a carrier's providing an open channel for two or more direct electrical connections. It is essentially a 'store and forward' function. "Circuit-switching, on the other hand, involves the establishment of a completed transmission path prior to the communication of any information." The speed of computers, the FCC continues, has blurred the historical distinction but its importance remains. In circuit-switching, the information flow is through a switching matrix, not the computer; in message-switching, "any information transmitted from terminal points must necessarily pass through [the computer] and undergo some processing by the computer."*

inal Notice. And the timing, probably, was optimum. The coming need was certainly recognized by a few people two or three years earlier, but we honestly wonder how many organizations that responded to the 1966 Notice would have been capable of presenting a reasoned answer to the same request published in, say, 1963. If this could have been done, then the obvious solution is for the FCC and/or similar agencies to attract very bright "industry philosophers" who can ponder the future and formulate questions five years before their answers are needed; if this is impossible, perhaps the ease-by-case approach is the best after all.

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The FCC and data processing

For data processing companies, the good news from the Tentative Decision is that the FCC has not decided it can regulate the industry; the important news is that data processing services provided by common carriers (except for AT&T, which can't offer them) will not be regulated. The question of whether or not the FCC even has jurisdiction to regulate data processing offered by non-carriers is not really answered.

The FCC makes a big to-do over its charter and whether or not it has the right to regulate communications modes that weren't in existence when the Communications Act was written in 1934. It argues that it does. Also, it says that there is justification for Government intervention when the free enterprise system breaks down, but then makes a strong case for the active competition that now exists in the data processing marketplace.

As a matter of fact, the Commission executes an impressive dance among eggshells as it writes this portion of its decision. While the statement contains no flat declaration that the FCC actually has the power to regulate the data processing market, it leads the reader to believe that the FCC thinks it has this power. For example, the narrative concludes:

> However, if there should develop significant changes in the structure of the data processing industry, or, if abuses emerge which require the exercise of corrective action by the Commission, we shall not hesitate to re-examine the policies set forth herein.

Thus, the Commission isn't rescinding whatever power it may have over data processing in general.

The common carriers and data processing

With the exception of Bell System companies, says the FCC, communications common carriers will be allowed to provide data processing services through separate, unregulated corporate entities. This decision, however, once again appears to maintain the status quo. General Telephone and United Utilities -- the two largest independent carriers -- already have computer service subsidiaries; so does Western Union, which the FCC seems to think will benefit from more diversification via this route.

There are fears from several quarters over allowing carriers into data processing, but the FCC answers these head on:

> The dangers identified by respondents and by the SRI study relate primarily to the alleged ability of common carriers to favor their own data processing activities by discriminatory services, cross subsidization, improper pricing of common carrier services, and related anti-competitive practices and activities. We recognize that these dangers may be real and could have substantial adverse effects on non-carrier data processing companies. We are confident, however, that the steps we are taking herein will provide adequate protection against possible abuses. On the other hand, the additional competitive spur provided by carrier participation in data processing can and should, with the specific safeguards, promote innovation, efficiency, economy, and diversity with resulting new and improved services at lower prices to users of data processing.

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Proposed Rule: FURNISHING OF DATA PROCESSING SERVICES

Along with its Tentative Decision, the Federal Communications Commission submitted Proposed Rule 64.702. After prohibiting common carriers from furnishing data processing service to others in any other way, the rule says:

(b) Except for the Bell System companies, common carriers may, subject to other provisions of law, have a controlling or lesser interest in, or be under common control with, a separate corporate entity that furnishes data processing service to others provided the following conditions are met:

- Each separate corporation must maintain its own books of account, have separate officers, utilize separate operating personnel, and use equipment and facilities devoted exclusively to the rendition of data processing services;

- Each such common carrier shall file with the Commission a complete statement of the terms and conditions of every written or oral contract, agreement or other arrangement entered into between such carrier and any such separate corporation; and

- No carrier [with operating revenues exceeding $1 million] shall engage in the sale or promotion of data processing services on behalf of its data processing affiliate.

A new kind of "hybrid" for the computer industry

In 1966, just before the FCC Inquiry was announced, Bunker-Ramo Corp. got into a hassle with the common carriers in setting up Telequote IV, a service designed to supply information on securities and forward messages. Such a system is a good example of what the FCC calls a "hybrid system." It involves both message switching and data processing and the primary purpose is moot.

Because of such services, the FCC has asked the question as to when message-switching, when offered in combination with data processing, should be treated as a sale of communications, and therefore regulated. In the next sentence, the Tentative Decision says: "There is no pat formula . . ." But it offers a general guideline. When message switching is an integral part of and incidental to a data processing package, "there will be total regulatory forebearance," except for the case where carriers are offering such a service through affiliates. "If, on the other hand, the package offering is oriented essentially to satisfy the communications or message-switching requirements of the subscriber," the service will be subject to regulation. So case-by-case decisions will be the rule, and "these distinctions [will] be carefully applied" so that the "essential nature" of a service will not be "artificially obscured."

Under the above hybrid theory, AT&T will be able to offer the new user services it has talked about for Touchtone telephones. But the FCC implies that it will be ever vigilant. "We intend to maintain a careful and continuous observation of the activities of the Bell System companies in their use and application of computer technology . . . to the end that [they] shall not offer data processing which is not clearly incidental to communications . . ."

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FCC REQUESTS SATELLITE SYSTEM PROPOSALS

Shortly before the FCC officially ended its computer/communications inquiry (page 1), it launched another stage in the domestic satellite inquiry which also was opened in 1966. In a "Report and Order" about the Establishment of Domestic Communications-Satellite Facilities by Non-Governmental Entities (Docket 16495), released March 24, the Commission urged organizations to present detailed applications for satellite systems and comments on proposed rule makings. In this:

- The FCC asks would-be satellite system sponsors to file proposals for various special, general-purpose, private, or common carrier facilities. These will give its Commissioners a concrete basis for determining policy.

- Since AT&T's role in the satellite communications area is crucial, the FCC has asked for comments. Should the dominant carrier of earth-bound communications also be allowed to launch its own satellite, or only to lease circuits? Should AT&T stick to public message service, or carry private data, TV, and other special-service transmissions as well?

- Conflicts over scarce frequencies and orbital parking slots are likely to arise. The FCC calls for suggestions on resolving these difficulties and on policies toward procurement of the facilities.

The FCC says it will "proceed with the authorizing process as promptly as possible," but the time it takes to file proposals, obtain approval, and construct a system will likely cost the United States another three, four, or more years before it gets its own satellites for TV, data, and voice communications.

Million-dollar bid

Even the FCC admits that it may cost about a million dollars to prepare the detailed application needed for a domestic satellite system. Of course, construction costs could run to 100 times that amount, so the Commission doesn't expect to get many such propositions. The only organization which so far has said that it intends to file an application is Communications Satellite Corp., or Comsat. This company -- owned 29% by AT&T, 8% by other common carriers, and the rest by the general public -- has the U.S. monopoly on international satellite communications. (It wholesales circuits to common carriers, who retail them to the public.)

Two groups control what may be key chunks of potential satellite business -- broadcasters and AT&T. A successful satellite network would have to carry transmissions from at least one of these if it is to survive. But the three television networks are studying the situation . . . and Bell hasn't yet said whether it will launch its own satellite or lease circuits on someone else's.

Conflicting opinions

Since Intelsat's first "bird" went up in 1965, the costs of international communications have been melting. Indeed, Malasia is the latest country to hook into the world-wide network of ground stations coordinated through the International Telecommunications Satellite Consortium. And General Electric said last December that it is testing time-sharing service via satellite to London-area customers.

So the technology is here. "Novel questions of law and policy," however, (and pauses while task forces appointed first by Pres. Johnson, then Pres. Nixon, studied

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the issue) have stalled authorization of any satellite facilities since ABC's 1965 suggestion for a domestic television broadcast system. And now, five years later, everyone may wait some more until the networks restudy the question and decide what they want to do.

In January, the White House sent a Memorandum to FCC Chairman Dean Burch, appointed last fall by Pres. Nixon. This memo set forth the Executive Department's opinion on the satellite matter and suggested that satellite communications be completely opened to all comers so that the market could decide which participants and what types of setups were, indeed, the most efficient. Under this suggestion, there would be checks placed on common carriers so that there would be no possibility of inter-service subsidization or other problems traceable to the carriers' monopoly in traditional communications.

But at the Federal Communications Commission, where the buck stops, the approach is more conservative. The FCC has thrown open its door for proposals from all comers. But it warns in its Report that applications may be turned down even though the costs of filing are high. Free entry is just one of the FCC's criteria.

According to the White House brief, technical and financial qualifications should be the only test for allowing non-carriers to put up systems, and economic viability or the effect on AT&T and other carriers should not be taken into account. The FCC, however, may chose to weigh these latter two factors, as well. So the standards by which possible systems will be judged, as well as the outcome of the judgement, seem to be in question.

One point in the report, however, is clear. There should be some kind of domestic communications satellite service. And of the remaining uncertainties -- about demand for service, costs, and frequency allocations -- the FCC says:

> In our judgement, however, these uncertainties cannot be resolved by another round of written comments or by additional studies. Indeed, a critical consideration in this respect would appear to be what persons, with what plans, are presently willing to come forward to pioneer the development of domestic communications satellite services . . .

Satellite communications for computer users

Transmission via signals bounced off a satellite may offer unique promise as a way of reaching many receivers from one relay point. Also, it eliminates much of the switching required in terrestial networks. And communications costs are not related to distance, except for local loops needed to connect users to ground stations. It is for reasons such as these that GE has told the FCC that time sharing -- including nationwide access to centralized data bases -- and other computing operations would adapt well to satellite communications.

Before satellites for such purposes can be launched, however, the FCC must settle a basic issue: Should special-purpose carriers and private users put up a system, or should the major carriers control a single, general-purpose network of satellite and ground stations. Several companies now have applications before the FCC asking for special-purpose carrier status so that they can provide surface microwave communications to data processing users (EDP/IR Dec.31,1969). And one of these -- Data Transmission Co. -- has mentioned satellite circuits as a potential link in its hoped-for nationwide network. It says it will file comments on the satellite inquiry with the Commission.

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March 2, - March 13, 1970

NEW YORK STOCK EXCHANGE	1969-70 High	1969-70 Low	2 Week Sales in 100's	2 Week High	2 Week Low	Last	2 Week Net Change	2 Week % Change
Addressograph-Multigraph	85	42 5/8	860	48 1/4	43	45 3/8	+ 1 1/8	+ 2.5
American R & D	99 1/2	44	1657	89 1/2	79 1/8	85 5/8	- 3 5/8	- 4.1
Ampex Corp.	49 7/8	32 1/2	2002	40	33 5/8	35 3/4	- 2 7/8	- 7.4
Bunker Ramo	17 5/8	9 1/2	1519	13 5/8	12 3/8	12 3/4	- 5/8	- 4.7
Burroughs	172 3/4	120 3/4	4336	150 7/8	129 1/2	131 1/4	-17 7/8	-12.0
Collins Radio	69 3/4	20 1/2	470	25 1/2	23 1/4	24 3/4	-	-
Computer Sciences	34 3/4	19 1/2	1432	25 3/8	22 1/8	23	- 1 5/8	- 6.6
Control Data	159 1/4	58	2007	66 1/2	63	65 1/2	+ 1	+ 1.6
Data Proc. Fin. & Gen.	60 1/4	19 3/4	816	25 1/2	21	21	- 1	- 4.5
Electronic Assoc.	25 1/4	7 5/8	350	9 1/2	7 7/8	8 1/8	+ 1/8	+ 1.6
General Electric	98 1/4	67 5/8	4314	75 3/8	70	70 1/4	+ 1/2	+ 0.7
Honeywell	157 1/4	107 3/4	1383	139 1/2	122 1/2	124 5/8	-14 1/8	-10.2
IBM	387	291 3/4	4531	341	315 1/4	324 1/4	-16	- 4.7
ITT	60 1/2	46 1/4	4009	59 1/4	54 1/4	55	- 4	- 6.8
Leasco	54	16 1/2	2279	21 1/8	19 1/8	19 1/8	+ 1/2	+ 2.7
Litton	74 1/2	24 3/8	2634	28 1/2	26	26 1/2	- 1 7/8	- 6.6
Memorex	173 7/8	65	3988	138 3/4	117 1/4	122 1/2	-11 1/4	- 8.4
Mohawk Data Sciences	89 1/8	59	4926	76 1/4	59	60 3/4	-15 3/4	-20.6
National Cash Register	171 3/4	108	2617	147 3/4	129 1/2	130 7/8	-14 3/4	-10.1
Planning Research	53 1/4	23 7/8	1192	48 1/4	37 1/4	37 1/4	-11	-22.8
RCA	48 1/8	29 1/4	5710	33	30	30 3/4	+ 1	+ 3.3
Raytheon	50 1/4	26 1/2	1113	29	26 3/4	27	- 1 1/2	- 5.3
SCM	47 1/8	18 5/8	651	21 1/4	19 1/2	19 7/8	-	-
Sanders	61 7/8	16 1/4	460	19 5/8	17 1/4	17 1/4	- 1 3/8	- 7.4
Sangamo	43 1/2	19 1/4	326	25 3/4	23	23 3/4	- 1 1/2	- 5.9
Singer	87 7/8	62	902	79 5/8	76 1/2	78 3/4	- 3/8	- 0.5
Sperry Rand	55 1/2	33 3/4	1864	38 7/8	36 3/4	37 3/4	- 5/8	- 1.7
Teledyne	45 1/2	24 3/8	3661	28 3/4	24 3/8	24 3/8	- 2 1/8	- 8.0
Telex	159 1/2	20 3/4	5258	137 3/8	112 1/8	113 1/8	-21 1/8	-15.7
University Computing	111 1/2	48 1/8	3947	61 3/8	48 1/8	48 7/8	-11	-18.4
Xerox	115 3/4	85 1/4	6649	95 7/8	89 5/8	90 1/4	- 1/2	- 0.5
NYSE COMPUTER STOCK AVERAGE							- 4.9	- 5.8
AMERICAN STOCK EXCHANGE								
Applied Data Research	32 7/8	8 5/8	551	11 1/2	8 5/8	8 3/4	- 2 1/8	-19.5
Automatic D P	47 3/4	34 1/8	1410	47	39 1/8	39 5/8	- 6 7/8	-14.8
Calcomp	37 1/2	18 1/4	584	30 1/8	26 5/8	26 3/4	- 2 7/8	- 9.7
Clary Corp.	25 3/4	6 1/8	233	8 3/8	6 1/8	6 5/8	- 1 1/2	-18.5
Computer Applications	21 7/8	6	128	9 1/4	7 7/8	7 7/8	- 7/8	-10.0
Computing and Software	75 3/4	37	907	64	50 1/4	53 1/4	-10 1/2	-16.5
DPA, Inc.	13 5/8	6 1/2	201	7 3/4	6 5/8	6 5/8	- 3/4	-10.2
Data Products	27 7/8	12 3/8	1963	21 3/4	17 1/4	17 1/2	- 4	-18.6
Digital Equipment	124	54 1/2	1970	112	98 3/4	106	- 6 3/4	- 6.0
Granite Mgt.	45 1/2	14 1/4	180	15 3/4	14 1/2	15 3/4	+ 3/8	+ 2.4
Greyhound Computer	28 5/8	11 1/2	145	13 3/4	12 3/8	12 3/8	- 1/4	- 2.0
ITEL	37 5/8	14 1/4	1333	20 1/4	14 1/4	15 3/4	- 3 7/8	-19.7
Levin-Townsend Comp.	57 1/2	8 1/2	1856	12 7/8	8 1/2	9 1/4	- 2 1/2	-21.3
Milgo Elect.	84 1/2	17 7/8	2854	72 1/4	60 5/8	61 1/4	- 1 1/8	- 1.8
Potter Instrument	46	23 3/4	1481	41 7/8	37 3/8	38 3/8	- 3 1/4	- 7.8
Sys. Eng. Labs.	53 7/8	26 1/8	1506	42 1/2	33 1/2	36 3/4	- 4 3/4	-11.4
AMSE COMPUTER STOCK AVERAGE							- 3.2	-11.6

OVER-THE-COUNTER	1969-70 High Bid	1969-70 Low Bid	Bid	Asked	2 weeks ago Bid	2 week net change Bid	2 week % Change Bid
Aries Corp.	19	3 5/8	3 3/4	4 1/2	4	- 1/4	- 6.3
Bolt, Beranek & Newman, Inc.	19	7 1/2	10 1/4	11	10 1/2	- 1/4	- 2.4
Computer Usage	40	5 1/4	7 1/2	8 1/4	5 3/4	+ 1 3/4	+30.4
Cyber-tronics	18 1/4	8 1/2	8 1/2	9 1/2	12 3/4	- 4 1/4	-33.3
Digitronics	22 1/2	8 1/4	8 1/4	9 1/4	11 3/4	- 3 1/2	-20.0
Fabri-Tek	12 7/8	5 5/8	6 1/2	7	6 3/4	- 1/4	- 3.7
Informatics, Inc.	30 1/4	11 3/4	15 1/2	16 1/4	13 1/2	+ 2	+14.8
LMC Data, Inc.	8 1/4	1 3/4	2 5/8	3 1/8	2 3/4	- 1/8	- 4.5
Management Assistance	4 7/8	2 1/8	2 1/8	2 1/2	3 1/4	- 1 1/8	-34.6
Optical Scanning Corp.	118	33	33	36	38	- 5	-13.2
Recognition Equipment Inc.	83 1/2	52	52 1/2	53 1/2	68	-15 1/2	-22.8
TBS Computer Centers Corp.	36	11	18	20	20	- 2	-10.0
Tally Corp.	36	15	20 1/2	21 1/2	22	- 1 1/2	- 6.8

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" APRIL 27,1970 • VOL.5,NO.12 P.J.McGOVERN,EDITOR

Marketing battle royal shapes up

IBM ANNOUNCES PRICE-COMPETITIVE PLAIN PAPER COPIER; XEROX SUES AND SEEKS INJUNCTION: IBM PROMISES QUICK DELIVERIES

Hours before IBM announced its long-awaited "plain paper convenience copier" on Tuesday, April 21, Xerox lawyers walked into the U.S. District Court for the Southern District of New York and filed suit against IBM for patent infringement. According to the Xerox statement,

> . . . in 1968 and again in 1970, Xerox refused IBM's request for a license under the Xerox patents to manufacture and sell xerographic office copiers of the type which IBM proposes to market. IBM is now licensed under the Xerox patent to use xerography for computer equipment and, pursuant to the license agreement, Xerox provided IBM with confidential data, know-how, and trade-secret information relating to xerography for use of such equipment. Xerox asserts that the confidential information has been used in connection with office copiers contrary to the terms of the agreement.

And IBM seemed prepared for the legal action. Shortly after the suit was filed, a spokesman for IBM's Office Products Division was able to answer:

> In developing the IBM copier announced today, IBM made a very careful review of the patents held by Xerox and determined that this product does not infringe any valid Xerox patent, or use any Xerox confidential information. As to other charges made in the complaint, IBM said they are without foundation. IBM said it would defend the suit filed by Xerox this morning with all its resources.

At this point, EDP/IR can't help but wonder if there is an adverbial scale for measuring a company's planned defense. When Control Data and DPF&G sued IBM for alleged monopolistic practices in the computer, it retorted that it would defend itself "vigorously." Then, when the Justice Department filed its antitrust suit, IBM decided to defend itself "forcefully." Now, IBM promises to defend with "all its resources." This includes $7.4 billion in assets, 250,000 employees, plenty of computers, and $226 million of long-term debt at a skimpy 3-1/2% interest.

Assuming the "injunction against marketing of the machine" is not granted, we anticipate perhaps the most important industrial marketing battle of the century. It could make Hertz and Avis look like amateurs! In this issue, therefore, EDP/IR takes a close look at this not because we have changed our "Industry" charter but because we consider the situation important to two major computer manufacturers.

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What IBM is offering

The new IBM Copier, already being manufactured at Lexington, Ky., is being introduced initially only in New Jersey, Delaware, and portions of New York, Connecticut, Pennsylvania, Massachusetts, Maryland, Virginia, West Virginia, and Ohio Within these areas, delivery will be 30 to 60 days, and schedules for the remainder of the country will be announced before the end of this year.

Certain to be only the first in a family of machines, the Copier (with no announced model number) seems to be most directly competitive with Xerox's medium-size machines such as the console Model 720. Here is a rundown on the principal features of the IBM Copier:

- It is roll-fed with one of two types of plain bond paper. Because of this, a simple selector button allows standard (8-1/2 by 11-inch) or legal-size documents to be copied with no change of paper. On the other hand, this feature prevents the use of specialized, colored, or textured paper.

- The copier will accept originals up to 14 by 17 in., but will copy only from an 8-1/2 by 11-in. area in one corner of the document. It will take a book up to about one-inch thick, with the same restriction. The reason for this is that the document rests on a flat bed that actually moves laterally across the machine before it is in position over the lens.

- Electrical requirements are simply a separate 115-volt, 15-amp power source. Because of this, the copier can easily be moved from one location to another.

- One to ten copies can be selected, and the selector automatically returns to the "1" position after each use. Thus, extra copies cannot be made inadvertently. There is no external counter, however, so longer runs -- for which the machine's pricing makes it less competitive -- are a matter of counting by tens.

- There is no drum that needs cleaning. Essentially, the IBM Copier contains a drum that is wrapped with a coated film that automatically winds up and exposes a new surface after every 4000 copies.

- Toner is supplied in a disposable cartridge that simply snaps into position. No pouring or stirring is required.

- Copy quality from IBM's demonstration machine appears at least as good as that from the Xerox 720. In particular, the IBM Copier seems less prone to "gray up" a background, tends to give a sharper image from an original that contains colors, and appears to have far fewer of the dirt spots that tend to build up on a Xerox after some use before scheduled cleaning.

- No warm-up time is required. The first copy is delivered in 15 seconds, subsequent ones every 6 seconds. Thus, according to published manufacturers specifications, the IBM Copier (rated at 600 copies an hour) will outrun the Xerox 720 (rated at 720 copies an hour) for the first 24 copies of any original. And as pointed out above, the pricing of the IBM machine is designed to compete at the low copy/document level.

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The mysterious price per copy

In addition to stressing concepts such as minimal care, less waiting time for the first copy, "virtually jam-free" operation, and flexibility of location -- all concepts which come from the specifications listed across the page -- IBM is talking price competition for the medium-sized user. This in itself is practically a first for IBM.

The price announced by IBM is straightforward: $200 a month rental plus 2.3¢ per copy; supplies, naturally, are extra. Xerox, for many of its copiers, has pricing that varies depending on the total number of copies per month or on the number of copies of each original. The Xerox 720, the copier that IBM seems most likely to be selling against, has a $25 monthly use charge and the following pricing:

First three copies of same original	4.5¢ each
Fourth through tenth copies of same original.	3.0¢ each
Eleventh and all additional copies of same original . .	2.0¢ each

The additional direct cost factor is paper. IBM supplies two grades of white paper rolls, one plain and one a watermarked bond. A roll of the less expensive, which is similar in appearance and feel to that supplied by Xerox, costs $3.25 in medium size lots and will produce 625 copies; a ream (500 sheets) of Xerox paper in similar size lots costs $1.75. Thus the paper cost per copy is 0.52¢ for IBM's less expensive paper and 0.35¢ for Xerox standard bond.

For comparative purposes, we have calculated the "crossover" point (the number of copies per month) at which the direct cost on a Xerox 720 or 630-III would begin to be greater than on the IBM Copier. Here are the results:

- Case 1: All copies on the Xerox 720 made on the first meter only (i.e., no more than three copies from an original). This case is highly improbable, but is the lowest volume at which IBM would be less expensive. . 8,610 copies per month

- Case 2: Copies being produced with a mix of 70:20:10 on the three meters, with prices as outlined above. This is considered a fairly normal situation . . . . . .11,820 copies per month

- Case 3: Copies being produced with a mix of 60:20:20 on the three meters. This is a situation with a considerable amount of high-volume copying, and probably borders on being best handled on a larger model. . . .12,230 copies per month

The cost to the customer in each of these cases would be:

Case 1 -- $443, or 5.14¢ per copy
Case 2 -- $533, or 4.51¢ per copy
Case 3 -- $545, or 4.45¢ per copy

It is clear from the above that IBM salesmen will not be able to compete on a cost basis for customers whose copying costs are less than $500 per month. Naturally, other factors will be pushed, but the parameters above define IBM's prime prospects.

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Careful, cautious moves in a chess game

The reason Xerox filed a detailed complaint hours before IBM actually held its press announcement is that -- in a sense -- this was simply the next move in a complicated chess game that started some 19 years ago. Recently, the interchange has been more and more rapid, culminating with a one-paragraph letter from Thomas J. Watson, Jr., IBM board chairman, to C. Peter McColough, Xerox president, on April 7. Xerox's complaint spells out the opening:

> On March 6, 1951, IBM was granted a license under [Xerox] patents . . . now expired, to make, use and sell apparatus utilizing xerographic techniques in data processing operations . . . [It] did not extend to office copiers.
>
> On January 21, 1955, IBM was granted a further license, which is still in effect, under all of [Xerox's] patent and patent applications and under [Xerox's] trade secret information, and confidential data and know-how to make, use and sell xerographic plates . . . and xerographic powders . . . The license does not extend to office copiers.
>
> On December 14, 1967, IBM advised Xerox that it was considering marketing a xerographic office copier commencing in the last quarter of 1969 and that sixteen of [Xerox's] patents that appeared to relate to its copier were invalid or would not be infringed. At the same time, IBM requested a license for office copiers under any patents as to which Xerox disagreed with the IBM analysis.
>
> Thereafter, on April 18, 1968, [Xerox] advised IBM that marketing of the proposed IBM office copier would infringe valid Xerox patents . . . and that no license could be granted for office copiers . . . since such patents are directed to the heart of [Xerox's] commercial office copiers.
>
> On February 27, 1970, [Xerox], having been informed that IBM was considering marketing the same xerographic office copier described to Xerox in 1967, advised IBM again that, . . . no license for office copiers could be granted under the Xerox Patents in questions and that [Xerox] would be compelled to enforce those patents in the event of infringement by IBM.
>
> On March 5, 1970, [Xerox] identified to IBM three additional patents not included among those theretofore identified by IBM which appeared to be applicable to the IBM copier as described to Xerox in 1967. At that time, [Xerox] also advised IBM that further information about the proposed IBM copier would be necessary to determine some of the infringement questions.
>
> On March 17, 1970, [Xerox], at IBM's request, described the further information required to evaluate certain infringement questions.
>
> At a meeting with IBM's representatives on March 20, 1970, [Xerox] explained in detail why the Xerox patents alleged by IBM in December, 1967 to be invalid are, in fact, valid, and obtained from IBM more detailed information about the structure and operation of the proposed IBM xerographic office copier.
>
> IBM wrote to Xerox on April 7, 1970, stating that, in its opinion, the proposed IBM copier would not infringe any valid Xerox patents.
>
> On April 8, 1970, Xerox advised that . . . nine additional Xerox patents . . .

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appeared to be applicable to the proposed IBM xerographic office copier, based upon the information given to Xerox at the meeting of March 20, 1970, and indicated that further information would be necessary in order to determine the applicability of some of the newly identified patents.

Following this detailed historical reckoning, Xerox -- in the complaint -- says it understands that "IBM plans to manufacture, use and offer for sale or lease in the open market during the second calendar quarter of 1970 . . . xerographic office copiers as described to Xerox on March 20." It continues:

> If [IBM] is permitted to proceed . . . not only will [Xerox] be deprived of substantial revenues as a result of losses of sales or leases of its own xerographic office copiers, but, in addition, other competitors or potential competitors will be encouraged to infringe the Xerox Patents . . . which protect the heart of [Xerox's] commercial office copiers to the irreparable damage and injury of [Xerox].
>
> [IBM's] proposed and threatened infringement . . . will adversely affect [Xerox's] ability to derive revenue . . . under other patents.
>
> [Xerox] has stated in its position to [IBM] by written and oral communications and [IBM] has contradicted [Xerox's] position by written and oral communications. Such controversy presents a real, immediate, and substantial question of conflicting legal interests as to which [Xerox] seeks the judgment of this Court.
>
> [Xerox] faces immediate, real, substantial, and irreparable damage and injury from [IBM's] threatened and imminent, willful, wanton, and deliberate infringement of the Xerox Patents.

The information above is from Count I, "an action for a declaratory judgment relating to patent infringement." The Xerox complaint also contains Count II, "an action for patent infringement," and Count III, "an action for unfair competition relating to patents." In this section of the complaint Xerox says that it "disclosed in confidence . . . confidential data and know-how resulting from expenditures by Xerox of extensive time and effort and very large sums of money in research and product development relating . . . to the manufacture and use of xerographic plates and xerographic powders." The complaint goes on to list specifics.

Then, Xerox says that it has "received no compensation from IBM for access to the confidential data and know-how and the trade secret information disclosed to IBM." This is because the early agreements call for royalties paid over 16 years "from the IBM commercial apparatus announcement date." These royalties are as high as 27% of the net selling price; however, "no royalty or compensation shall be payable for experimental use." Xerox concludes by saying:

> IBM has used [Xerox's] confidential data and know-how and trade secret information in the manufacture of commercial xerographic office copiers, contrary to the provisions of the 1955 agreement under which such confidential data and know-how and trade secrets were disclosed to IBM. Such unauthorized use is to the great damage and detriment of [Xerox] and constitutes unjust enrichment of [IBM] and endangers [secrets acquired at] great cost.

In its prayer, Xerox asks the court to declare that IBM's "manufacture, use, sale, or lease" of its new copier infringes Xerox patents and "constitutes improper

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and unauthorized use of . . . confidential data and know-how and trade secret information given [IBM in] the 1955 agreement: It also asks for a preliminary and permanent injunction, costs and attorneys' fees, and treble damages.

Nothing unexpected

This battle between Xerox and IBM, as the complaint indicates, has been brewing for a long time. Indeed, in July of 1964 we said:

> One of the most subtle and interesting examples we have witnessed in some time of a battle of nerve and wits between two major corporations has been taking place between the Xerox Corp. and IBM. Both companies appear headed for a show-down . . . Both use roughly the same formula for business enterprise, viz., produce a device used to increase the efficiency of business operations whose manufacturing cost is a relatively low percentage of its selling price, and lease it . . . to extend its revenue-producing life . . .

But the generally accepted feeling is that the two companies have had a tacit standoff understanding. Xerox wouldn't actually get into computers, IBM wouldn't actually get into copiers, and both might battle -- with perhaps different techniques -- for the image processing middle ground. But, last fall, Xerox bought Scientific Data Systems. So now, some say, IBM is taking its retribution. Each company seems to have taken an inevitable path, and the battle -- in addition to being fought in the courts -- will be felt in the offices of most businesses.

The copier market

At yearend 1969, according to best published estimates, some 850,000 copiers were in use within the United States. Of these, we estimate that 380,000 or 45% were Xerox machines installed at some 200,000 sites. When revenues from copiers and supplies are considered, however, the picture changes. Xerox reported 1969 revenues of $826 million from Business Products ("rentals and sales of . . . principally our copiers and copier/duplicators"). So if published estimates of $1.1 billion in U.S. copier revenues for last year are correct, Xerox has 75% of the industry revenue.

Xerox, of course, has a high percentage of the large-copier and copier/duplicator market. It has the relatively low percentage by number of copiers because it really doesn't compete in the low-cost end of the market where there are some 30 or more competitors with equipment using various processes.

Marketing aspects

With its new copier, IBM is after about 50% of the copier business in this country. As pointed out earlier, it can't talk price to customers who make much fewer than 10,000 copies a month, nor can it compete at the high end or copier/duplicator portion of the marketplace. But it is well set up to tackle this middle portion of the market.

IBM's Office Products Division (OPD) generated an estimated $850 million of U.S. revenue last year, roughly the same as Xerox's Business Products Group. And its salesmen -- about 2500 as compared to Xerox's estimated 2200 -- handle accounts that are already users of copy machines. As a matter of fact, OPD salesmen often know Xerox's customers better than the Xerox salesmen do. The IBM salesmen are already calling on accounts that have dictation equipment, typewriters, and/or

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sophisticated reproduction equipment such as the magnetic tape/Selectric typewriter. They know where copy machines are located and how well the customer likes the equipment he is using.

In addition, the OPD salesmen have been told that any account with five or more typewriters is a potential copier customer, and that any with over ten likely should have one. The marketplace research has been thorough. So, as IBM said in its press announcement: "Now we can offer our customers an even wider selection of word processing products . . . the equipment that helps people transform ideas into printed communications more efficiently."

The new copier is a top-of-the-line product for OPD salesmen, carrying more quota points than any other single piece of equipment they sell. And the sales force is enthusiastic. So, as Xerox begins its second decade in the copier business, it looks as if it will finally have to face real competition. Interestingly, many observers have said for several years that Xerox has done an excellent job of emulating IBM's marketing techniques. Now, its salesmen -- and marketing executives -- will get a taste of their own medicine.

Legal problems appear to be IBM's biggest headache, but one would think that IBM's lawyers know what they are doing. Indeed, one reason for IBM's delay in entering this market is that it wanted to make sure that Xerox patents were skirted. And many features of IBM's copier seem to have evolved as IBM engineers designed around patents. Assuming no injunction is granted, we would have to question whether IBM will long be Number 2 in any market it has chosen to enter.

LEVIN VS. TOWNSEND VS. LEVIN-TOWNSEND VS. . . .

Last Thursday, Howard Levin filed an antitrust suit against IBM in the Southern District Court of New York. This action, however, wasn't just a jump onto the get-IBM bandwagon for the co-founder of Levin-Townsend Computer Corp. It is part of a three-way struggle which involves, among other things, a nearly $50 million debt owed by the leasing company to IBM and a proxy fight promised for this July's annual meeting. There, Levin will try to recapture the company presidency from James Townsend, who ousted him from that spot in January of this year.

Levin brings charges under Sections 1 and 2 of the Sherman Act and Sections 2 and 3 of the Clayton Act, restricting discrimination among customers and tie-in sales (EDP/IR Jan.9,1969). He argues, as did DPF&G last year, that IBM has favored its rental customers over purchasers of its equipment, and that the computer industry giant has set out to drastically limit the markets of leasing companies.

The complaint -- which Levin filed on behalf of Levin-Townsend stockholders as well as on his behalf (and Levin-Townsend is named as a defendent along with IBM) -- also says that IBM has "fraudulently breached its representations and agreements to furnish software goods and services for the . . . life of the equipment . . ." and that IBM has illegally required Levin-Townsend to purchase, rather than rent, certain "features" and "memory upgrades." These and other practices named in the suit have, according to the complaint, contributed to Levin-Townsend Computer Corp.'s financial difficulties.

The Prayer for Relief specifically states claims amounting to $1.5 billion. Levin asks that IBM be kept from collecting portions of its debt from Levin-Townsend, at least until the Court has determined offsetting damages and has revised contracts which involve tied purchases of "features" and "memory upgrades."

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March 16, - April 3, 1970

	1970 High	1970 Low	3 week Sales in 100's	3 week High	3 week Low	Last	3 week Net Change	3 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	42 5/8	944	47 3/4	44	45	- 3/8	- 0.8
American R & D	99 1/2	77 1/4	1742	92 1/4	77 1/4	85 1/2	- 1/8	- 0.1
Ampex Corp.	48 1/2	33 5/8	2110	39 1/2	34 5/8	35 1/8	- 5/8	- 1.8
Bunker Ramo	14 1/2	11 1/4	2393	13 3/4	12 3/8	13	+ 1/4	+ 2.0
Burroughs	172 3/4	129 1/2	4616	154 3/4	130 3/8	144 1/8	+12 7/8	+ 9.7
Collins Radio	37 1/4	20 1/2	757	27 1/4	24 1/2	26 1/4	+ 1 1/2	+ 6.1
Computer Sciences	34 1/8	20 1/4	2313	24 3/8	20 1/4	21	- 2	- 8.7
Control Data	122 1/2	52	4900	66	52	52 1/2	-13	-19.8
Data Proc. Fin & Gen.	32	19 5/8	978	23	19 5/8	20	- 1	- 4.8
Electronic Assoc.	11 5/8	7 5/8	344	9 3/8	8	8 3/4	+ 5/8	+ 7.7
General Electric	77 5/8	67 5/8	6225	75 7/8	69	74 1/4	+ 4	+ 5.7
Honeywell	152	121	2289	133 5/8	121	127 1/2	+ 2 7/8	+ 2.3
IBM	387	315 1/4	4165	340 1/2	317 3/4	326 1/2	+ 2 1/4	+ 0.7
ITT	60 1/8	51 1/4	7508	55 3/4	51 1/4	54	- 1	- 1.8
Leasco	30 1/2	16 1/2	2003	20	17	17	- 2 1/8	-11.1
Litton	38	24 1/8	3204	26 1/8	24 1/8	24 1/2	- 2	- 7.6
Memorex	166 3/4	106 1/2	5875	134 3/4	111	117	- 5 1/2	- 4.5
Mohawk Data Sciences	87	55 1/2	3230	63 1/2	55 1/2	60 1/2	- 1/4	- 0.4
National Cash Register	171 3/4	129 1/2	1078	143	130	130 3/4	- 1/8	- 0.1
Planning Research	53 1/4	31	2483	44 7/8	31	32 7/8	- 4 3/8	-11.8
RCA	34 5/8	29 1/4	4362	31 3/8	29 3/4	30 3/4	--	--
Raytheon	33 5/8	26 1/2	1743	28 7/8	26 5/8	27 3/4	+ 3/4	+ 2.8
SCM	24 3/4	18 1/4	803	20	18 1/4	18 1/4	- 1 5/8	- 8.2
Sanders	29 7/8	14 5/8	878	17 3/4	14 5/8	15	- 2 1/4	-13.0
Sangamo	29 1/8	20 7/8	427	23 3/4	20 7/8	21 3/4	- 2	- 8.4
Singer	85 3/4	75	1162	81 5/8	75 1/2	80 5/8	+ 1 7/8	+ 2.4
Sperry Rand	40 3/8	33 3/4	3083	38 1/2	35 1/2	36	- 1 3/4	- 4.6
Teledyne	40	22 3/8	3750	26 3/8	22 3/8	25 3/8	+ 1	+ 4.1
Telex	159 1/2	90 1/4	8240	143	112	133 7/8	+20 3/4	+18.4
University Computing	99 3/8	35 3/8	7069	48	35 3/8	35 7/8	-13	-26.6
Xerox	115 3/4	87	10350	95 7/8	87	87	- 3 1/4	- 3.6
NYSE COMPUTER STOCK AVERAGE							- 0.2	- 2.4
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	7 1/2	563	8 7/8	7 1/2	7 5/8	- 1 1/8	-12.9
Automatic D P	47 3/4	35 5/8	1513	43 1/4	35 5/8	40 3/4	+ 1 1/8	+ 2.8
Calcomp	33 7/8	23 1/4	1029	29 7/8	25 1/2	26 1/2	- 1/4	- 0.9
Clary Corp.	10 1/2	6 1/8	191	7 3/4	6 1/2	7	+ 3/8	+ 5.7
Computer Applications	12 3/8	6	178	8 3/8	7 3/8	7 7/8	--	--
Computing and Software	75 3/4	49	874	59	49	49	- 4 1/4	- 8.0
DPA, Inc.	10 3/8	6 1/4	376	7 3/8	6 1/4	6 1/4	- 3/8	- 5.7
Data Products	25 1/2	17 1/8	1639	20	17 1/8	18 3/8	+ 7/8	+ 5.0
Digital Equipment	124	91 3/4	2735	110	91 3/4	98	- 8	- 7.6
Granite Mgt.	22 1/4	14 1/4	339	18 3/8	15 3/8	17 3/8	+ 1 5/8	+10.3
Greyhound Computer	14 1/8	11 1/8	169	12 3/4	11 1/8	11 1/2	- 7/8	- 7.1
ITEL	25 1/2	12 3/4	1035	17 3/8	12 3/4	15	- 3/4	- 4.8
Levin-Townsend Comp.	19 3/8	7 1/8	1121	9 5/8	7 1/8	7 1/2	- 1 3/4	-18.9
Milgo Elect.	84 1/2	58	6129	80 5/8	58	72 3/8	+11 1/8	+18.2
Potter Instrument	42 3/4	27 1/2	1710	42 3/4	35	39 7/8	+ 1 1/2	+ 3.9
Sys. Eng. Labs.	49 1/8	33 1/2	1298	39 3/8	34	36 5/8	- 1/8	- 0.3
AMSE COMPUTER STOCK AVERAGE							- 0.1	- 1.3

	1970 High Bid	1970 Low Bid	April 3 Bid	April 3 Asked	3 weeks ago Bid	3 week net change Bid	3 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	8	3 1/4	3 1/2	3 7/8	3 3/4	- 1/4	- 6.7
Bolt, Beranek & Newman, Inc.	11 1/4	8 1/2	8 3/4	9 1/2	10 1/4	- 1 1/2	-14.6
Computer Usage	8 1/2	5 1/4	7	7 3/4	7 1/2	- 1/2	- 6.7
Cyber-tronics	15	8 1/4	10 3/4	11 3/4	8 1/2	+ 2 1/4	+26.5
Digitronics	13 3/4	8	8 3/4	9 3/4	8 1/4	+ 1/2	+ 6.1
Fabri-Tek	8 1/4	5 1/2	5 1/2	6	6 1/2	- 1	-15.4
Informatics, Inc.	20 1/2	13	13 1/2	14 1/4	15 1/2	- 2	-12.9
LMC Data, Inc.	3 5/8	1 7/8	2 3/4	3 1/4	2 5/8	+ 1/8	+ 4.8
Management Assistance	4	2 1/8	2 1/2	2 3/4	2 1/8	+ 3/8	+17.6
Optical Scanning Corp.	52	24	32	35	33	- 1	- 3.1
Recognition Equipment Inc.	83 1/2	45 1/2	49 1/2	50 1/2	52 1/2	- 3	- 5.7
TBS Computer Centers Corp.	27	15 1/2	17 1/2	19 1/2	18	- 1/2	- 2.8
Tally Corp.	23	17 1/2	19	20	20 1/2	- 1 1/2	- 7.3

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MAY 4,1970 • VOL.5,NO.13 P.J.McGOVERN,EDITOR

BURROUGHS SURPASSES IBM IN CUSTOMER LOYALTY; LATEST STUDY SHOWS DRAMATIC GAINS BY NCR, GRADUAL COMPETITIVE EROSION FOR IBM

A computer manufacturer has only two places to look for new customers: (1) an organization that never had a computer, or (2) a computer user who previously was operating with another manufacturer's equipment. In a continuing program to assess what is happening in the latter and larger portion of the computer marketplace, EDP/IR has recently completed its fourth Customer Loyalty Profile Analysis.

To measure "brand loyalty" in the computer business, EDP/IR's research staff analyzed a cross-section of the Domestic Computer Installation Data File maintained by the International Data Corporation, its publisher. Examining reports from computer installation sites with equipment on order, we constructed a table (page 3) that provides a measure of customer loyalty and competitive gain or loss for the major computer manufacturers. Highlights of this study (U.S. only) are:

- NCR's Century series brought a high number of defectors from users of small IBM equipment. Because of this, NCR has the highest competitive gain -- in pure numbers as well as in percentage -- of any of the major manufacturers. This confirms the trend pinpointed in our Review and Forecast issue (EDP/IR Mar.12,1970), that NCR had 13% of 1969 shipments in the Small submarket (incorrectly printed as 18%).

- Univac is Number 2 in value of installed equipment, but it showed up worst in our Loyalty study, primarily because its 1004 and 1005 customers -- given no simple upgrade choice -- have acted more like brand new customers and given their business to IBM and other manufacturers. The competitive loss isn't quite so serious as it may seem, however, since Univac's larger computers often are ordered by "mixed" installations, which aren't considered in this study.

- Burroughs not only gained customers for its small-to-medium 2500s and 3500s; it also did so with only minor losses. As a result, it showed the highest loyalty ratio of any manufacturer. This would indicate that Burroughs' strategy of marketing to specialized application areas -- such as to financial users -- is working well.

- Honeywell showed a small, but positive, competitive gain in customers. Surprisingly, the gain is in the Small submarket, an area where Honeywell had been slipping. Since Honeywell is one of the few major manufacturers that decided not to unbundle, the pricetag may explain this.

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- IBM's 87% loyalty ratio is second only to that of Burroughs, but once more drops slightly. This gradual erosion is to be expected as other manufacturers increase their marketing muscle. And, it will likely continue, even if IBM's market share were to increase.

It is highly important for readers to realize the restraints in this study:

+ Only U.S. sites are included, so large amounts of foreign business -- strong market areas for Univac, Control Data, and General Electric, for example -- are not reflected.
+ The figures reflect only computer installations that have one computer with another on order, or that have several computers from the same manufacturer. "Mixed" sites (see table) are not included.
+ First users are not counted. The sites studied are described above.
+ The figures presented are all in numbers of sites. Naturally, one large computer replacement such as a CDC 6500 knocking out an IBM 360/50 can mean far more in dollars than a dozen Century 100s replacing 360/20s.

Business-oriented breakthroughs

In addition to IBM, there are two companies that entered the computer industry via a prior interest in business machines -- cash registers in the case of NCR, banking and bookkeeping equipment for Burroughs. Interestingly, as the computer industry feels the result of mature product lines and economic pressure, it is these two companies that show up with unusually high ratios for both customer loyalty and for competitive gain.

NCR, in its one-basket ploy, is beginning to prove that it means computers. It had the largest competitive gain percentage -- 68% -- and held a very respectful loyalty ratio as well. Of the 32 competitive gains reported in our sample, 29 -- over 90% -- came from IBM 360/20s and 1130s. The appearance of the supposedly scientific 1130 may seem unusual, but in a separate study of this marketplace we found that some 40% of 1130 users do business applications about 65% of the time.

On the other hand, NCR's losses -- all of them second generation equipment such as the 315 and 500 -- were primarily to IBM. These earlier users, much like those of Univac 1004s and 1005s, are not given a clear-cut upgrade path, and must be wooed just like new customers. In its success with the line of computers we have termed as transition generation equipment (EDP/IR Mar.13,1968), NCR is creating a situation that requires a product announcement in the near future. Most computer users have growing computational requirements, and a central processor larger than the Century 200 is rapidly becoming a must for the NCR salesman.

Burroughs emerges from our current study 91% competition free -- a level attained in the past only by IBM. The twelve gains we uncovered come from several different manufacturers, with IBM and RCA suffering four losses each. And most of Burroughs' customers stay with their computer supplier. This high loyalty rate most likely reflects the composition of the customer base -- oriented as it is toward particular applications -- and the fact that Burroughs offers a complete family of computers.

And it has additional attraction for larger users. The 5500, old as it is, is a machine announced ahead of the time that users could appreciate it, and is one of the few computers around today that reflects an appreciation of firmware -- the circuitry is designed to assist software implementation. And the philosophy behind this computer is reflected in Burroughs' other large offerings, even though the giant 8500 is back in engineering and still a name, not a machine.

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SUMMARY -- CUSTOMER LOYALTY PROFILE

VENDOR	(1) # Customers Gained from Competitors	(2) # Customers Lost	(3) # Customers Re-Ordering from Vendor	% Loyal (3) / (2) + (3)	% Competitive Gain or Loss of Customers (1) - (2) / (2) + (3)
BURROUGHS	12	3	32	91%	+26%
CONTROL DATA	4	2	2	*	*
GE	7	1	3	*	*
HONEYWELL	12	10	23	70%	+ 6%
IBM	31	59	395	87%	- 6%
NCR	32	9	25	74%	+68%
RCA	4	7	8	*	*
UNIVAC	7	19	17	47%	-33%

* The size of the sample involved -- 623 sites -- and distribution by manufacturer are considered representative. For CDC, GE, and RCA, however, the actual numbers are small and the difference of one unit would produce significant percentage changes. Also, the sample includes 63 "mixed" sites -- locations where equipment from several different manufacturers was installed and a mix of equipment was on order. In many of these, the three companies involved showed up in significant numbers, but direct loyalty cannot be determined. Therefore, we have not presented the percentages for CDC, GE, and RCA.

Conclusions

Since the information for this study was collected in late 1969, there have been several product announcements that are not reflected: Honeywell, GE, and Burroughs have announced new small computers, and IBM has added communications capabilities to System/3. These will definitely have a bearing on the small computer market, and probably will show up in our next study.

And we consider these studies important, even though they usually upset some of the manufacturers. It is much less expensive for a manufacturer to upgrade a current customer than to unearth a new one, and we like to know how they are doing. The figures here give an insight into what's going on out where the computers are.

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IDC STUDY SUGGESTS SURGE IN NON-KEYPUNCH DATA CAPTURE DEVICES

When computer users are asked to gaze into their crystal ball and visualize the type of data capture device they would prefer in the future, by far the largest number choose optical character recognition. Looking out as far as 1973, however, these same users don't expect to make any dramatic shifts toward OCR, and say its share of the total data capturing equipment market will stay the same. At least that's the upshot of what several thousand users have told the International Data Corporation -- publisher of EDP Industry Report -- in a recently completed study of the data capturing equipment market.

This apparent anomaly is probably based on a hope that OCR equipment will eventually drop significantly in price. A first move in this direction came recently when Viatron -- the "computers for the masses" organization -- announced an optical character reader that is based not on recognition of characters but on a special bar code designed into a stylized font called -- you guessed it! -- Viafont. These readers sell for prices between $2400 and $7200, amounts normally talked about as monthly rental ranges. Other competitive entries are expected shortly.

The IDC survey -- in addition to establishing that OCR is, as always, in the dreams of many computer users -- indicates that the keypunch era is finally fading. Users say they want to chuck the noisy, ubiquitous, pre-computer machines in favor of more up-to-date input methods. The three comers are:

- Direct input devices -- on-site data stations such as IBM's 1050, various typewriter-like units, and cathode ray tubes, all coupled to a computer system. If the growth in this area follows user expectations of 41% a year, direct input will account for over one-third of the nearly $6 billion of data capture devices installed at yearend 1973. (That $6 billion figure is double today's base.)

- Data collection equipment -- primarily low-cost, simple-to-operate devices used mostly off-line today. Though constituting only a small portion of the current data capture market, data collection devices will grow at 37% a year in value, reflecting the spread of these peripherals from the factory floor to retail and office locations.

- Key-to-magnetic media -- including key-to-tape and key-to-disk systems. This third significant growth area for data capture equipment is most directly competitive with the keypunch market. Mohawk started it and Honeywell jumped in with its Keytape. Now, more sophisticated key-to-disk systems are being introduced -- including a Keyplex system recently introduced by Honeywell -- and this type equipment as well as data collection devices will soon so resemble direct input devices that all three kinds may be considered as one within a few years.

The table (opposite) summarizes the expected increase in data capturing equipment, as shown in the IDC survey. Computer users are chosing among different concepts of data capture, as well as among the many eager suppliers. But at the same time, many are giving up the notion of finding The Device; instead, they will use several types to meet differing needs. The total growth rate barely matches the overall computer industry growth rate of 17% expected over the next five years. But this total includes a dropoff in the keypunch market as well as relative stagnation in MICR (magnetic ink character recognition) equipment. Almost all of the growth is funneled into segments that represent only 56% of today's data capture market.

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DATA CAPTURING EQUIPMENT MARKETS

	Est. % of Installed Value -- 1969	Est. % of Installed Value -- 1973
Keypunches & Verifiers	35	16
OCR	20	19
Direct Input	19	34
Key-to-Tape	12	17
MICR	9	6
Data Collection	5	8

The estimates for Direct Input devices do not, for the most part, include remote (off-site) terminals, which makes the expected jump in value perhaps even more remarkable. Keypunches at non-computer tab sites were likewise excluded from the survey, as were OCR's away from computer locations.

One of the prime reasons users install OCR and other types of data entry equipment is to cut down the necessary steps between the point of data capture -- such as a retail sale -- and its storage in a memory device. In the IDC study, users listed "human error" most frequently as a very serious input problem. Other frequently mentioned factors were operator training and equipment performance. Thus, any process telescoping input steps cuts down the potential for mistake.

Of course, the new mediums such as key-to-tape generally increase productivity, efficiency, and accuracy. But the computer user, ultimately, must continue to come to grips with the human factor. An IDC interviewer relates a perfect example: A midwestern data processing manager says that when he installed Mohawk key-to-tape equipment, productivity went up -- temporarily. So he tried Honeywell. Once again, productivity went up significantly, then dropped somewhat. At the time of the interview, he proudly showed off his new Univac keypunches, reporting that productivity had again picked up. One could be led to believe that "modern new equipment" -- a reflection of management interest -- is of considerable importance.

CONTINUING ACTIVITY IN OPTICAL SCANNING CENTERS

Recognition Equipment Inc., through its Corporation S subsidiary, has extended its chain of "optimation" centers to at least a dozen cities in the U.S. and to several abroad. At these data preparation sites (the latest opened in Seattle last month), the Dallas-based company rents time on the REI-built Electronic Retina Computing Reader, and charges by the numbers. Machines such as these were not included in the IDC survey (chart, above) but they do offer users an alternative to in-house OCR and a chance to dampen their feet. Corporation S says that "Optimation makes it possible and economically feasible for thousands of smaller companies to use OCR."

And Honeywell now apparently thinks this is an appropriate way to bring the user into OCR. Its new OCR center in Tampa -- opened April 1 -- could be the forerunner of additional centers around the country. Richard Douglas, general manager of Honeywell's Information Systems Division, emphasizes this by projecting a $110 million OCR service bureau business by 1974, up from $28 million in 1969. At this first Honeywell center -- located in Tampa because the supply of trainable people there is good -- documents will be received by plane and read onto tape for customers in the East. At present, one client keeps the center pretty busy.

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in "Group A" comprise the bulk of digital computers in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF APRIL 1, 1970

NAME OF MANUFACTURERS	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	205	$ 4,600	1/54	5	12	17	X
	220	$ 14,000	10/58	13	2	15	X
	B100 Series	$ 3,300	8/64	53	6	59	X
	B200 Series	$ 6,500	11/61	335	135	470	X
	B300 Series	$ 8,000	7/65	590	81	671	X
	B500 Series	$ 3,800	11/68	190	170	360	105
	B2500	$ 6,200	2/67	142	56	198	80
	B3500	$ 14,000	5/67	231	78	309	145
	B4500	$ 29,000	11/71	-	-	-	10
	B5500	$ 37,500	3/63	131	31	162	10
	B6500	$ 75,000	6/69	9	4	13	66
	B8500	$200,000	4/69	1	0	1	2
	Subtotal			1700	575	2275	418
Control Data Corp.	G-20	$ 19,600	4/61	12	9	21	X
	1604/A	$ 42,000	1/60	34	9	43	X
	31/3150	$ 10,500	12/64	95	49	144	10
	3200	$ 14,000	5/64	61	30	91	X
	3300	$ 20,500	9/65	126	92	218	33
	3400	$ 23,700	11/64	9	9	18	X
	3500	$ 25,000	1/69	10	10	20	16
	3600	$ 48,000	9/63	28	16	44	X
	3800	$ 53,000	12/65	18	4	22	X
	6400	$ 37,000	5/66	61	18	79	13
	6500	$ 58,000	12/67	10	3	13	3
	6600	$127,000	8/64	64	17	81	7
	7600	$240,000	1/69	3	0	3	6
	Subtotal			531	266	797	88
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	18	3	21	X
	PDP-10	$ 12,000	10/67	100	23	123	24
	Subtotal			118	26	144	24
Friden	System 10	$ 1,400	9/70	-	-	-	15
General Electric	53	$ 850	/70	0	0	60	20
	55	$ 1,350	1/66	70	1230	1300	140
	58	$ 1,500	11/69	20	80	100	125
	105	$ 1,350	3/69	50	130	180	150
	115	$ 3,000	4/66	490	1010	1500	110
	120	$ 3,600	1/70	0	30	30	90
	130	$ 6,200	10/69	5	50	55	100
	205	$ 2,900	6/64	7	0	7	X
	210	$ 16,000	3/60	31	0	31	X
	215	$ 6,000	9/63	8	2	10	X
	225-255	$ 7,000-$16,300	4/61-10/67	157	27	184	X
	235-265	$10,000-$18,000	4/64-10/65	98	17	115	X
	245-275	$16,700-$21,600	10/69-10/69	11	4	15	8
	405-410	$ 6,700-$10,500	2/68- /70	30	5	35	10
	415-420	$ 7,700-$18,000	5/64- 6/67	278	195	473	10
	425-430	$10,700-$16,700	6/64- /70	86	59	145	6
	435-440	$13,700-$23,800	9/65- /70	30	9	39	5
	615	$ 47,000	6/69	12	6	18	15
	625	$ 62,500	4/65	4	10	14	3
	635	$ 79,000	5/65	74	11	85	18
	645	$ 90,000	7/66	4	0	4	X
	655	$ 90,000	3/71	-	-	-	7
	Subtotal			1465	2935	4400	817
Honeywell, EDP	Series-15	$ 1,800	7/70	-	-	-	6
	110	$ 2,600	9/68	173	70	243	75
	115	$ 3,700	6/70	-	-	-	20
	120	$ 4,800	1/66	792	160	952	60
	125	$ 7,100	12/67	115	220	335	65
	200	$ 7,500	3/64	750	260	1010	X
	1200	$ 9,800	2/66	162	70	232	X
	1250	$ 12,000	8/68	179	45	224	60
	2200	$ 18,700	1/66	140	40	180	22
	3200	$ 22,000	2/70	4	0	4	30
	4200	$ 26,200	9/68	18	1	19	13
	8200	$ 50,000	2/69	10	2	12	12
	400	$ 10,600	12/61	50	36	86	X
	1400	$ 14,000	1/64	4	6	10	X
	800	$ 26,000	12/60	58	14	72	X
	1800	$ 46,000	1/64	15	4	19	X
	Subtotals			2470	928	3398	363

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IBM	System-3	$ 1,400	1/70	50	0	50	7000
	360/20	$ 2,900	12/65	7770	3550	11,320	2000
	360/25	$ 7,500	10/68	1570	360	1930	1700
	360/30	$ 10,500	5/65	8200	3320	11,520	750
	360/40	$ 19,300	4/65	3100	1505	4605	700
	360/44	$ 12,000	7/66	169	72	241	30
	360/50	$ 33,000	8/65	1340	530	1870	300
	360/65	$ 63,000	11/65	605	162	767	210
	360/67	$138,000	6/66	46	11	57	13
	360/75	$ 81,400	1/66	63	22	85	8
	360/85	$155,000	10/69	9	3	12	20
	360/9X	$150,000	11/67	12	3	15	X
	360/195	$232,000	3/71	-	-	-	14
	1130	$ 1,700	2/66	3790	1320	5110	580
	305	$ 3,600	12/57	7	11	18	X
	650	$ 4,800	11/54	24	16	40	X
	1401	$ 6,200	9/60	2050	1900	3950	X
	1401-G	$ 2,300	5/64	450	100	550	X
	1401-H	$ 1,300	6/67	157	39	196	X
	1410	$ 17,000	11/61	207	136	343	X
	1440	$ 4,100	4/63	1200	740	1940	X
	1460	$ 9,800	10/63	167	63	230	X
	1620	$ 4,000	9/60	720	412	1132	X
	7010	$ 26,000	10/63	48	12	60	X
	7030	$160,000	5/61	6	2	8	X
	704	$ 32,000	12/55	9	1	10	X
	7040	$ 25,000	6/63	38	40	78	X
	7044	$ 36,500	6/63	26	19	45	X
	705	$ 38,000	11/55	21	13	34	X
	7070/74	$ 27,000	3/60	184	59	243	X
	7080	$ 60,000	8/61	74	2	76	X
	709	$ 40,000	8/58	2	0	2	X
	7090	$ 63,500	11/59	33	27	60	X
	7094	$ 73,400	9/62	91	7	98	X
	7094-II	$ 79,400	4/64	18	2	20	X
	Subtotal			32,256	14,459	46,715	13,325
NCR	Century-100	$ 2,600	9/68	660	135	795	1000
	Century-200	$ 7,700	6/69	185	90	275	450
	304	$ 14,000	1/60	18	3	21	X
	310	$ 2,500	5/61	16	3	19	X
	315	$ 9,000	5/62	360	380	740	X
	315-RMC	$ 12,500	9/65	100	50	150	X
	390	$ 1,000	5/61	360	405	765	X
	500	$ 1,200	10/65	1640	1000	2640	60
	Subtotal			3339	2066	5405	1510
Philco	1000	$ 7,000	6/63	13	1	14	X
	210/211	$ 40,000	10/58	12	1	13	X
	212	$ 52,000	1/63	12	1	13	X
	Subtotal			37	3	40	
RCA	Spectra 70/15	$ 4,500	9/65	68	91	159	27
	Spectra 70/25	$ 7,200	9/65	27	39	66	10
	Spectra 70/35	$ 11,000	1/67	190	180	370	65
	Spectra 70/45	$ 21,000	11/65	336	120	456	62
	Spectra 70/46	$ 36,000	11/68	44	3	47	18
	Spectra 70/55	$ 35,000	11/66	26	9	35	8
	Spectra 70/60	$ 38,000	9/70	-	-	-	20
	Spectra 70/61	$ 50,000	2/71	-	-	-	12
	301	$ 7,500	2/61	340	215	555	X
	3301	$ 19,000	7/64	76	8	84	X
	501	$ 14,000	6/59	60	2	62	X
	601	$ 35,000	11/62	5	0	5	X
	Subtotal			1172	667	1839	222
Standard Computer Corp.	IC-4000	$ 9,000	9/68	12	0	12	4
	IC-6000	$ 16,000	5/67	9	0	9	X
	IC-7000	$ 17,000	6/69	12	0	12	7
	Subtotals			33	0	33	11
Univac	I/II	$ 25,000	3/51-11/57	16	4	20	X
	III	$ 25,400	8/62	51	36	87	X
	File Computers	$ 15,000	8/56	2	0	2	X
	SS-80/90	$ 8,000	8/58	104	63	167	X
	418-I/II	$ 13,700	6/63	78	88	166	X
	418-III	$ 19,600	7/69	13	6	19	15
	491/492	$ 27,000	12/61	39	24	63	X
	494	$ 41,400	2/66	43	28	71	10
	1004	$ 1,900	2/63	1330	1290	2620	X
	1005	$ 2,550	4/66	745	195	940	X
	1050	$ 8,800	9/63	235	120	355	X
	1103/1105	$ 35,000	12/50	6	0	6	X
	1106	$ 40,000	12/69	8	1	9	14
	1107	$ 57,000	10/62	15	17	32	X
	1108	$ 68,000	9/65	123	71	194	35
	9200	$ 1,700	6/67	1090	545	1635	300
	9300	$ 4,000	9/67	605	660	1265	235
	9400	$ 10,000	5/69	52	30	82	130
	LARC	$135,000	5/60	1	0	1	X
	Subtotal			4556	3178	7734	739
Xerox Data Systems	Sigma-5	$ 7,700	8/67	136	33	169	28
	Sigma-7	$ 16,600	12/66	81	23	104	18
	SDS-940	$ 25,000	4/66	70	9	79	X
	SDS-9300	$ 8,500	11/64	33	8	41	X
	Subtotal			320	73	393	46
	Totals			47,997	25,176	73,167	17,588

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April 6, - April 17, 1970

	1970 High	1970 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	39 5/8	626	45	39 5/8	40	- 5	-11.1
American R & D	99 1/2	73 3/4	1753	86 1/4	73 3/4	76 1/4	- 9 1/4	-10.8
Ampex Corp.	48 1/2	22	5708	34 3/8	22	23 7/8	-11 1/4	-32.0
Bunker Ramo	14 1/2	11 1/4	1100	12 7/8	11 1/2	11 5/8	- 1 3/8	-10.6
Burroughs	172 3/4	129 1/2	3682	144 3/4	131 1/2	132 3/4	-11 3/8	- 7.9
Collins Radio	37 1/4	20 1/2	375	26 3/8	22 1/4	23	- 3 1/4	-12.4
Computer Sciences	34 1/8	14 5/8	7902	17 1/4	14 5/8	15 3/8	- 5 5/8	-26.8
Control Data	122 1/2	45 3/4	3062	52	45 3/4	48 1/4	- 4 1/4	- 8.1
Data Proc. Fin. & Gen.	32	14 1/4	1199	19 3/4	14 1/4	15 7/8	- 4 1/8	-20.6
Electronic Assoc.	11 5/8	7	214	8 5/8	7	7	- 1 3/4	-20.0
General Electric	77 5/8	67 5/8	3700	77	74	75 3/4	+ 1 1/2	+ 2.0
Honeywell	152	121	1586	128 1/2	122 1/8	124 3/4	- 2 3/4	- 2.2
IBM	387	315 1/4	3250	337	317 1/2	322 1/2	- 4	- 1.2
ITT	60 1/8	49 1/8	4244	54	49 1/8	49 1/4	- 4 3/4	- 8.8
Leasco	30 1/2	13	2580	17	13	14 1/4	- 2 3/4	-16.2
Litton	38	21 7/8	2244	24 1/2	21 7/8	22 1/2	- 2	- 8.2
Memorex	166 3/4	103 1/8	3067	120 1/4	103 1/8	105	-12	-10.3
Mohawk Data Sciences	87	42 1/2	3773	60	42 1/2	45	-15 1/2	-25.6
National Cash Register	171 3/4	124	2788	133	124	125 1/2	- 5 1/4	- 4.0
Planning Research	53 1/4	22	3942	31 3/4	22	24	- 8 7/8	-27.0
RCA	34 5/8	25 1/4	2668	30 5/8	25 1/4	26 1/2	- 4 1/4	-13.8
Raytheon	33 5/8	26 1/4	798	27 7/8	26 1/4	26 1/2	- 1 1/4	- 4.5
SCM	24 3/4	13 3/8	1270	18 3/8	13 3/8	15 3/8	- 2 7/8	-15.8
Sanders	29 7/8	13	512	15 1/4	13	13 1/4	- 1 3/4	-11.7
Sangamo	29 1/8	16 5/8	384	22 1/4	16 5/8	16 3/4	- 5	-23.0
Singer	85 3/4	75	1040	81 1/4	75	76	- 4 5/8	- 5.7
Sperry Rand	40 3/8	26 3/8	5427	35 3/4	26 3/8	27 3/4	- 8 1/4	-22.9
Teledyne	40	19 1/4	3167	25 1/4	19 1/4	19 7/8	- 5 1/2	-21.7
Telex	159 1/2	90 1/4	6981	137 1/2	112 1/4	114	-19 7/8	-14.3
University Computing	99 3/8	28 1/4	2944	38 1/4	28 1/4	29 3/4	- 6 1/8	-17.1
Xerox	115 3/4	81 1/4	8152	87 3/4	81 1/4	84 7/8	- 2 1/8	- 2.4
NYSE COMPUTER STOCK AVERAGE							- 5.7	-13.4
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	6 1/4	285	8 1/2	6 1/4	6 1/4	- 1 3/8	-18.0
Automatic D P	47 3/4	31	3170	40 1/2	31	31 1/8	- 9 5/8	-23.6
Calcomp	33 7/8	18 3/4	925	26 3/8	18 3/4	20 5/8	- 5 7/8	-22.2
Clary Corp.	10 1/2	5 5/8	164	7 1/8	5 5/8	5 3/4	- 1 1/4	-17.9
Computer Applications	12 3/8	5 3/8	393	7	5 3/8	5 7/8	- 2	-25.3
Computing and Software	75 3/4	38 1/2	1346	47 3/4	38 1/2	39 1/4	- 9 3/4	-19.9
DPA, Inc.	10 3/8	5 5/8	259	6 3/8	5 5/8	5 5/8	- 5/8	-10.0
Data Products	25 1/2	14 1/8	2490	18 1/2	14 1/8	14 1/2	- 3 7/8	-21.1
Digital Equipment	124	89 1/4	2026	105	89 1/4	90	- 8	- 8.2
Granite Mgt.	22 1/4	14 1/4	103	17 1/8	14 5/8	14 7/8	- 2 1/2	-14.4
Greyhound Computer	14 1/8	8 7/8	143	11 3/4	8 7/8	9	- 2 1/2	-21.7
ITEL	25 1/2	11 1/2	452	14 7/8	11 1/2	11 7/8	- 3 1/8	-20.8
Levin-Townsend Comp.	19 3/8	5 5/8	997	8	5 5/8	5 3/4	- 1 3/4	-23.3
Milgo Elect.	84 1/2	58	2314	75 7/8	64	65 1/2	- 6 7/8	- 9.5
Potter Instrument	42 3/4	27 1/2	2518	39 7/8	30	32 1/2	- 7 3/8	-18.5
Sys. Eng. Labs.	49 1/8	26	1687	37	26	29	- 7 5/8	-20.8
AMSE COMPUTER STOCK AVERAGE							- 4.6	-18.5

	1970 High Bid	1970 Low Bid	April 17 Bid	April 17 Asked	2 weeks ago Bid	2 week net change Bid	2 week % Change Bid
OVER-THE-COUNTER							
Aries Corp.	8	3 1/8	3 1/8	3 5/8	3 1/2	- 3/8	-10.7
Bolt, Beranek & Newman, Inc.	11 1/4	7 1/2	7 1/2	8 1/4	8 3/4	- 1 1/4	-14.3
Computer Usage	8 1/2	5 1/4	5 1/2	6	7	- 1 1/2	-21.4
Cyber-tronics	15	7 3/4	7 3/8	8 1/4	10 3/4	- 3 3/8	-31.4
Digitronics	13 3/4	8	8 1/2	9 1/2	8 3/4	- 1/4	- 2.9
Fabri-Tek	8 1/4	4 7/8	4 7/8	5 3/8	5 1/2	- 5/8	-11.4
Informatics, Inc.	20 1/2	9 1/2	9 1/2	10 1/4	13 1/2	- 4	-29.6
LMC Data, Inc.	3 5/8	1 7/8	2 3/4	3 3/4	2 3/4	--	--
Management Assistance	4	2	2 1/8	2 3/8	2 1/2	- 3/8	-15.0
Optical Scanning Corp.	52	24	25	28	32	- 7	-21.9
Recognition Equipment, Inc.	83 1/2	34	34	35	49 1/2	-15 1/2	-31.3
TBS Computer Centers Corp.	27	14 1/2	14 1/2	16 1/2	17 1/2	- 3	-17.1
Tally Corp.	23	17 1/4	17 1/2	18 1/2	19	- 1 1/2	- 7.9

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industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MAY 18,1970 • VOL.5,NO.14 P.J.McGOVERN,EDITOR

Framework for questions!

ANNOUNCEMENT OF IBM'S NEXT COMPUTER FAMILY EXPECTED; MEMBERS TO GIVE MORE BANG PER BUCK, USE TODAY'S PROGRAMS EFFICIENTLY

A copyrighted story, spread across Computerworld's front page this week, asks:

NEW FAMILY OF IBM COMPUTERS FOR SUMMER?

The gist of current expectations is presented in the story, part of which is repeated below. In this issue of EDP/IR, therefore, we will examine the major points presented in the CW story, and discuss them in the light of our expectation of their impact within the computer industry. In doing so, we hope to assist readers in preparing for and appreciating the announcements that are likely to come . . . maybe sooner than expected. The CW story states:

> Over the last five months Computerworld has assimilated facts and opinions on IBM's "fourth generation."
>
> The results of this investigation indicate that a new IBM computer family is in production today and scheduled for announcement this summer.
>
> The principal features of the new series will be:
>
> • Variable micrologic used for both instruction and execution processing, alterable through software.
> • Built-in communications capabilities.
> • Cost/performance ratios improved by a factor of from 6 to 12 over similarly priced IBM 360s.
> • Inclusion in all models of high-speed buffer memories similar to those introduced for the 360/195.
> • No machine language compatibility, but much simpler conversion than that required by the move to the 360.
>
> The family is dubbed the NS (for new or next system). Before introducing the product line, IBM is almost certain to change this name.
>
> Prices and some performance data may differ from those mentioned here as they are a function of IBM's market planning group. Historically, IBM has priced all its equipment to produce preplanned profit objectives. And current economic conditions may cause IBM to postpone announcement of the new family until late in the year.

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IBM continues, however, to follow its standard [practice] regarding "speculative material" and would not comment on the information in this article.

None of the above highlights is shocking; each is within the state of current technology; all seem designed to benefit the user. If they don't outline IBM's exact plans, they certainly indicate the major product specifications under consideration by planning groups at IBM and some other business computer manufacturers.

These expectations are being revealed at this time -- in Computerworld and in EDP/IR -- because there is increasing speculation about the "new systems" in the industry and because there is more and more evidence to argue for their reasonableness:

- The theoretical timing for a new round of computer announcements is here, and every manufacturer is carefully evaluating his plans
- Several models of System/360 have for some time been in at least "limited new production," if in production at all
- There is no indication that IBM has curtailed its production capabilities; new plants, in fact, are being built. Yet System/360 shipments are slowing down

And an efficient production capability must be kept well-oiled. There is every indication that some IBM manufacturing facilities are currently producing components for NS computers, and that a relatively short delivery time can be expected for NS once it is announced. An NS for Christmas, anyone?

"Variable micrologic"

At the very heart of the expected new family of at least four models is the concept CW has called variable micrologic. It is, essentially, a hardware arrangement that allows specialized software to alter the very hardware logic or instruction set of a computer.

An "add" instruction, for example, traditionally means that the computer should carry out the operation normally taught early in grammar school: 2 + 2 = 4. Using variable micrologic, however, the single instruction could be defined to mean: Do a "clock" type addition (11 + 5 = 4); or "take all the pieces of data, round them to the nearest thousand, calculate the relationship between them, and figure out the next number in the series."

What's more, it is understood that this type of alteration of the instruction set for handling special situations can be performed by a well-trained systems engineer in only a few hours. And the technique can be used for program conversion!

No compatibility . . . but efficient conversion

With a series of software/micrologic packages, IBM could interpret any existing 360 source language -- Basic Assembly Language, Cobol, Fortran, or the like -- into a form that is compatible with the new family of computers. The job of preparing the software for such a task -- even for a simpler operation such as changing the meaning of an instruction -- would not be trivial; on the other hand, it should be far easier and faster than the type of hardware and support involved in the compatibility features available today on models of the 360.

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To this end, reports indicate that the micrologic can be told to analyze the structure of an existing language, build the necessary cross-reference tables and reference listings, then directly produce a proper set of instructions for the NS computer. This would be "Liberation" on a massive scale, and mean that IBM is applying to itself the criteria that Honeywell used in introducing its H-200 to directly impact IBM's 1401s before IBM announced System/360.

IBM apparently has listened to complaints about conversion long enough, and with NS will probably prepare the necessary conversion software for 360s, 1401s, and 7000 series computers. It is not hard to imagine, however, that other companies -- perhaps new ones set up by IBMers who have already worked with NS computers -- going into the business of providing special software packages. They could convert computer programs -- those now operating on competitive equipment such as the Honeywell 200 series, the RCA Spectras, or existing machines from GE or Univac -- for the new IBM equipment.

If this happens, a new business opportunity could open up for software companies, and a new boost to IBM revenues could develop. Much like the third-party leasing companies that increased IBM's sales revenue while increasing IBM's customer base as they offered lower rental prices to users, these third-party conversion companies could stimulate an increase in IBM's market share by saving users conversion costs while making good money for themselves.

Built-in communications capabilities

The new family of IBM computers, according to the Computerworld story, will have built-in communications processing so that multiplexors and line controllers are eliminated. One argument presented is that "with the 50,000 bit/sec, transmission speeds for the System/3 communications option [EDP/IR Mar.4,1970], and with the high transmission speeds possible with the 2770 and 2780, IBM was clearly planning drastic changes in its communications architecture."

Such a movement of message control and line control into the central processor, the story points out, will give faster response time and more user control. It would also rely on a type of variable micrologic, and is similar to techniques successfully demonstrated by several minicomputer manufacturers during the Spring Joint Computer Conference two weeks ago in Atlantic City.

If this is done, it could have an impact on several smaller companies who presently build the type of communications equipment that would likely be replaced. This possibility, plus the likelihood that AT&T may begin to provide more alternatives of the same sort, could almost mean that the two giant companies in the computer/communications market could effectively take over most of the business available. It turns out, however, that the business available is not as great as some published reports would indicate: Currently, the equipment being sold for the computer/communications interface area is running at about $200 million a year, and is expected to increase to about $700 million a year by 1974.

The new processors themselves

The story this week in CW, much like other previous reports in publications such as Datamation, discusses at least four new processors in the NS family: the NS-0, NS-1, NS-2, and NS-2' (two prime). It does not go into detail about the computer dubbed internally by IBM as the 553. The latter machine is supposedly a supercomputer with the same essential organization as the other NS models, but having computational power that is quite similar to that of the 360/195 (see page 5).

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As a way of comparing the four NS models to those of present System/360 equipment, CW rated each in terms of today's 360/50. This member of the current IBM family has an average monthly rental of $32,000, and rentals can easily vary from $25,000 to over $40,000 a month. The 360/50's central processor — as differentiated from the peripherals such as tape and disk drives, card readers, and printers that comprise the bulk of the system's cost -- carries a $10,000 to $20,000 monthly pricetag. In the table below, each of the NS models is rated in terms of a 360/50 CPU (memory plus central processing logic):

IBM'S EXPECTED NEW FAMILY COMPARED TO THE 360/50

New System Model No.	Performance (360/50 = 1.0)	Prices for Processors and Memory (360/50 = $14,165 for 262K byte median system)	
NS-0	0.7 - 0.8	$ 2,300	32K bytes
		10,350	192K "
NS-1	1.4 - 1.9	$ 3,750	32K bytes
		21,700	512K "
NS-2	3.5 - 3.8	$10,350	128K bytes
		41,850	1024K "
NS-2'	5.0	$19,150	256K bytes
		44,850	1024K "

Data: COMPUTERWORLD

In addition to the above performance ratios, the smaller two processors are expected to have "accelerator features" that could bring the NS-0's performance up to 1.4 times the 360/50 and the NS-1's up to 3.0. The two larger models, which would be able to take optimum advantage of the family's design characteristics, are not expected to have this feature, and its cost is not indicated.

Each of the upward-compatible models expected to be announced in the family has a two-stage memory . . . a larger one (with capacities as shown above) made from ferrite cores, just like most computer memories in use today, and a smaller one built using bipolar semiconductor technology and operating at perhaps ten times the speed of the larger one. Because of this, CW says, the computers will operate at the higher speed -- about 60 nanoseconds, or billionths of a second -- of the smaller, buffer memory. This technique is used today in the large 360/195.

Because the prices above apply strictly to central processors, the reported cost/performance improvement of 6 to 12 times today's 360s would actually be more in the neighborhood of two to three times. This is true because newer peripherals, which are primarily electro-mechanical in nature, could at best be priced only a small amount under those in use today, and most of those used today could be expected to operate with the new family of processors.

This provides additional support for the relative pricing implied in the figures published by Computerworld: They tend to obey Grosch's First Law, which says that when a new series of computers is introduced, the user should expect about a quadrupling of power for a doubling of price. Either by design or by happenstance, the implications of this Law usually show up in new computer equipment.

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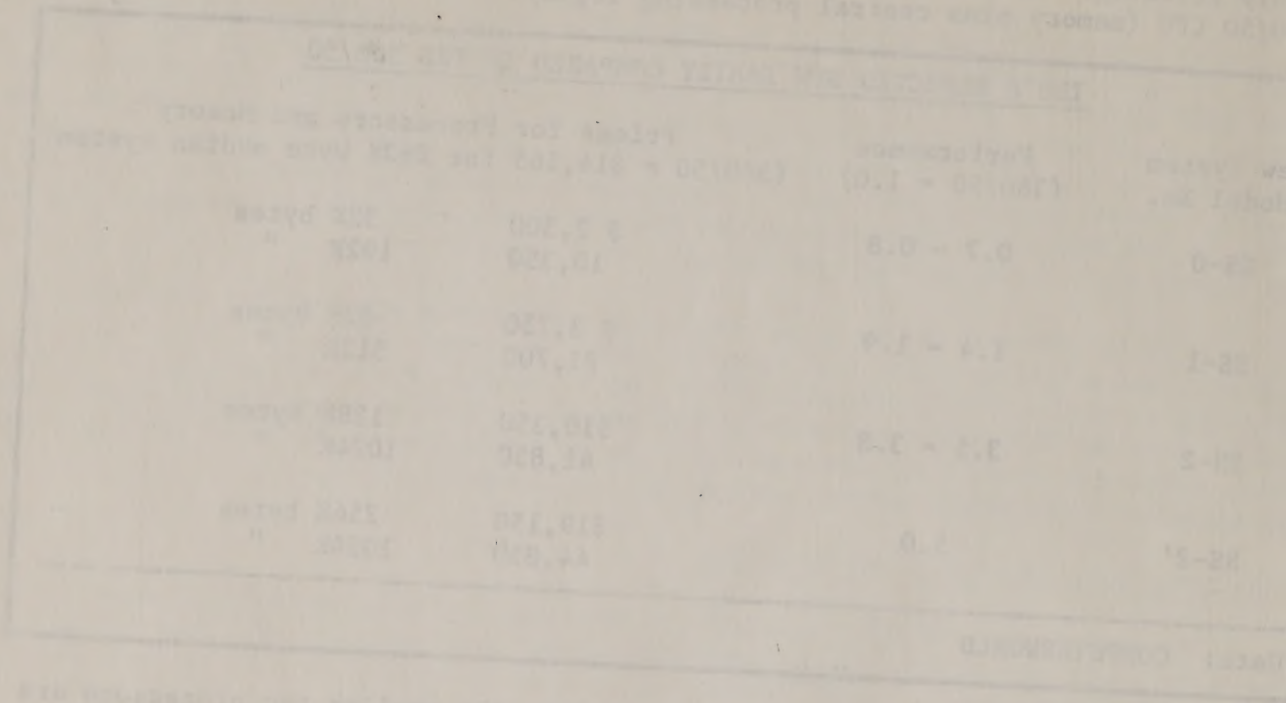

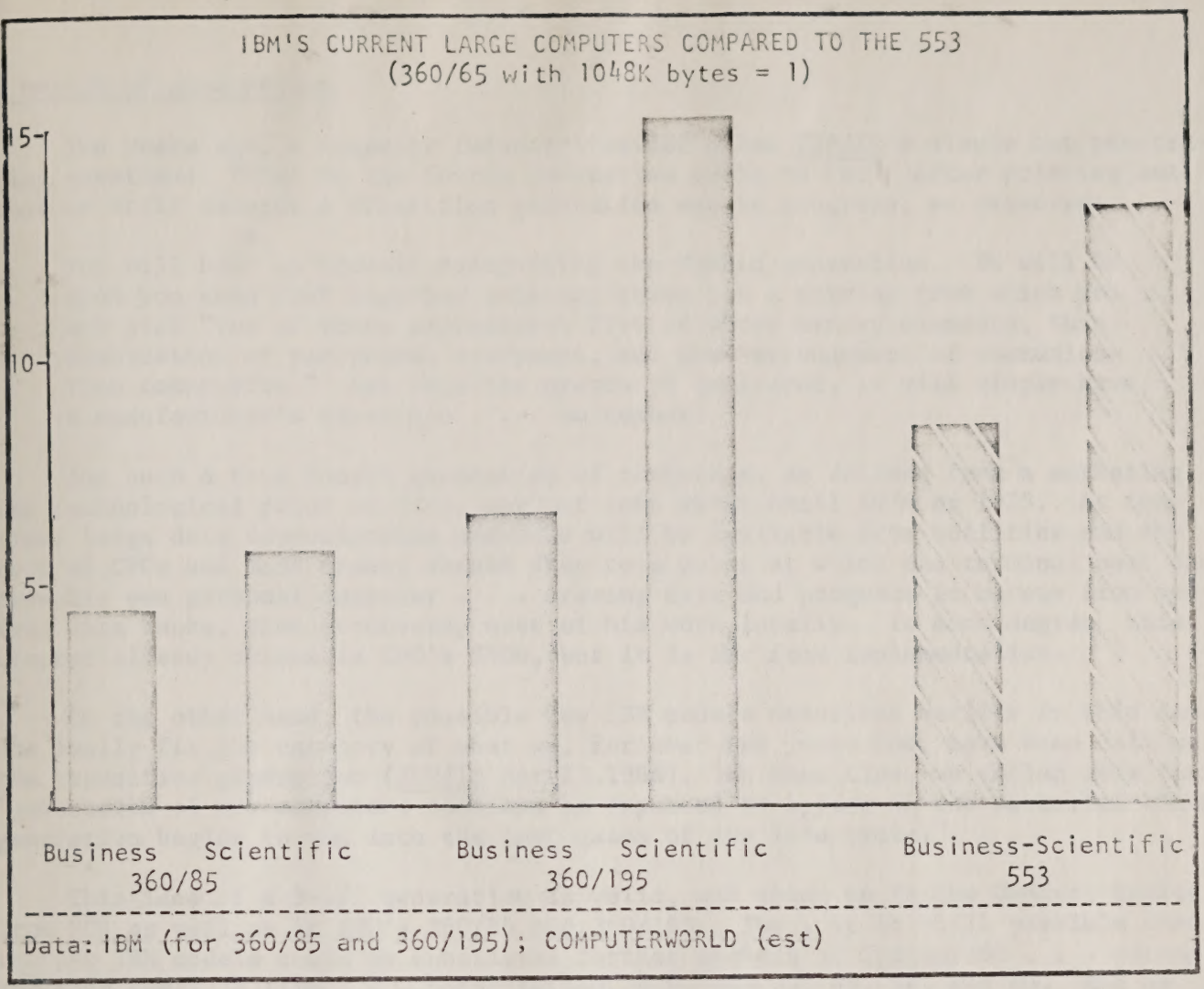

Another supercomputer?

As mentioned earlier, IBM is said to have another computer in the works. It has been talked about in the trade press as the 553, and looks like a real supercomputer (see above). With a performance (as compared to the 360/65) that looks better for business applications and almost as good for scientific work as the still-to-be-delivered 360/195, the 553, according to information gathered by Computerworld, would operate with either a 4K or an 8K memory buffer.

CPU prices for the 553 are reported by CW to be about $29,000 for a 256K version to about $73,000 for a 2092K model. With performance pegged at about 8 times the 360/65 for commercial processing and some 13 times for scientific work, this computer would be a real bargain. In a 1048 byte configuration, for example, the 360/65 CPU lists at $52,590, a comparable 360/85 for $84,320, the 195 about $105K.

The 553, therefore, seems to be the upgrade answer for current 360/65 users. Thus, if priced as above, it perhaps could spell trouble for Control Data's ever placing its 7600 in other than large, number-crunching applications. Ever since that machine was announced, however, there has been talk that CDC would eventually introduce smaller models -- and some business-oriented software. If it does, it would seem to need better price/performance ratios to even begin to compete with the 553 on a technical basis.

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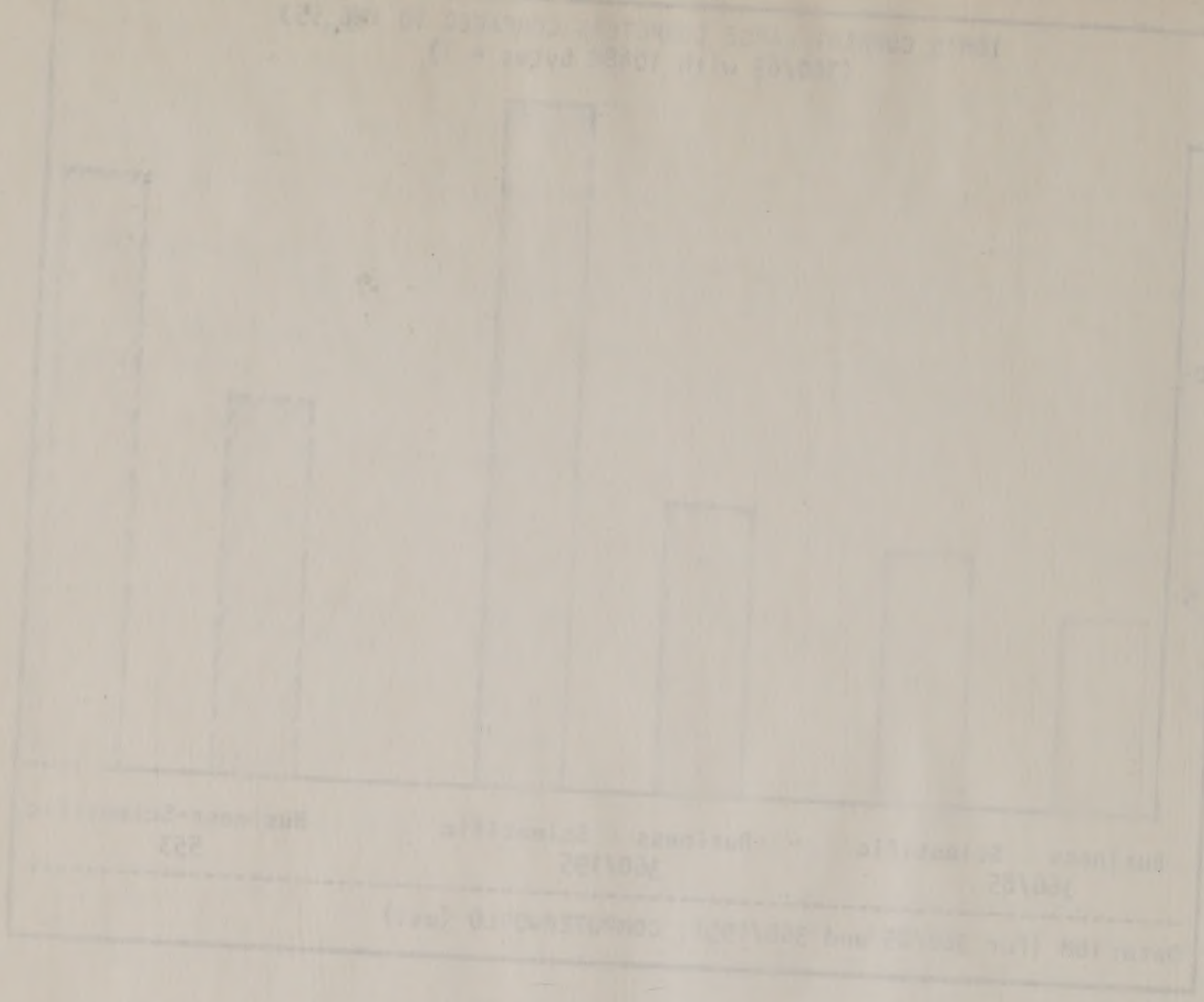

A matter of generations

Two years ago, a computer industry insider asked EDP/IR a simple but penetrating question: "What is the fourth generation going to be?" After pointing out that we still thought a transition generation was in progress, we answered:

> You will have no trouble recognizing the fourth generation. It will be upon you when your computer salesman shows you a catalog from which you can pick "two of these processors, five of those memory elements, this combination of peripheral equipment, and that arrangement of communication components." And when the system is delivered, it will simply have a manufacturer's nameplate . . . no number.

And such a true fourth generation of computers, as defined from a marketing and technological point of view, may not come about until 1974 or 1975. At that time, large data communication networks will be available from utilities and the cost of CPUs and mass memory should drop to a point at which the terminal user can have his own personal computer . . . drawing data and programs in bursts from central data banks, then processing most of his work locally. To some degree, this concept already exists in CDC's 7600, but it is far from implementation.

On the other hand, the possible new IBM models described earlier in this issue really fit the category of what we, for over two years now, have been calling the transition generation (EDP/IR Mar.13,1968). At that time, we called this the "generation of new computers that can be expected to appear as the so-called third generation begins to run into the last gasps of its life cycle."

This idea of a 3-1/2 generation is valid, and shows up in the Century Series from NCR as well as in IBM's 360/25 and 360/195. Thus, it is still possible that the new IBM models could be considered further members of System/360 . . . extending that family's life . . . being called, say, the 35, 45, 58, and 68. And as fars as the 553 goes, there are lots of numbers between 95 and 195!

Customer need vs. announcement timing

Many IBM customers probably have a need for new equipment, especially as they face current budget squeezes and additional costs from unbundled prices. On the other hand, there is speculation that IBM won't make an announcement until the economic climate shows definite signs of improving . . . or until it is convinced that its announcement would help improve the weather. IBM almost surely doesn't want to launch a new computer into a sea of disinterested customers.

Today, according to estimates by the International Data Corporation, publisher of EDP/IR, only 10% to 15% of computer users are CPU-bound. It would appear to us, therefore, that the NS computers, if introduced soon, could replace no more than 45% to 50% of today's 32,500 360s by the end of 1973.

IBM's 360/20 and 25 still have reasonably good backlogs according to the Computer Census we publish regularly, but above that level only 2000-odd 360s are on order. Thinking back to the time, just two years ago, when IBM was shipping nearly 1000 360s a month, and considering the fact that the company does not lay off production employees, we can't help but believe that something is in the works. The announcement may not come until late this year, or early next. In the interim, however, we have every reason to believe that IBM is manufacturing something, and that if the NS announcement is delayed, it will simply shorten the time between unveiling and first installation.

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NEW REGISTRATIONS BY COMPUTER COMPANIES

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

COMPUTER DESIGN CORP.

Computer Design Corporation, 12401 W. Olympic Blvd., Los Angeles 90064, an electronic calculator and minicomputer manufacturer, on March 18, filed 300,000 common. The proceeds, at terms to be supplied by amendment ($20 max.) will be used to repay debts, to purchase and develop capital equipment, and for on-going capital requirements. The underwriter will be Mitchum, Jones & Templeton, Inc., 510 S. Spring Street, Los Angeles.

DATA SYNETICS CORP.

Data Synetics Corporation, 41 B Street, Burlington, Mass. 01803, organized in 1968 to produce computer-based systems for commercial and government data processing, on March 3, filed 250,000 common. The proceeds, at $10, will be used for repayment of loans, expansion of sales force and advertising, manufacture and marketing of the company's Magnescriber systems, and development of related software. The underwriter will be Robert Cea & Co., Inc., 160 Broadway, New York.

HONEYWELL INC.

Honeywell Inc., 2701 Fourth Ave. South, Minneapolis ("the other computer company"), on March 4, filed 600,000 common. The proceeds, at terms to be supplied by amendment ($140 max.), will be used for working capital and capital expenditures requirements. The underwriter will be Eastman Dillon, Union Securities Co., 1 Chase Manhattan Plaza, New York.

INFOREX, INC.

Inforex, Inc., 21 North Ave., Burlington, Mass. 01803, a computer peripherals manufacturer, on March 13, filed 250,000 common. The proceeds, at a price to be supplied by amendment ($28 max.), will be used for engineering of the firms's key-to-tape system, equipment purchase, manufacturing, marketing, and other purposes. The underwriter will be Drexel Harriman, Ripley, Inc., New York.

KEANE ASSOC., INC.

Keane Associates, Inc., 36 Washington St., Wellesley Hills, Mass. 02181, a computer services company, on March 18 filed 175,000 common, of which 100,000 are to be offered for sale by the company and 75,000 (outstanding) by the company's president. The offering price will be supplied by amendment ($14 max.). Proceeds from the additional stock will be used for working capital and possibly for acquisition of other companies.

WABASH COMPUTER CORP.

Wabash Computer Corporation, 3003 North Central Ave., Phoenix 85012, on March 6, filed 200,000 common. The company, a Wabash Magnetics subsidiary, produces magnetic disc and disc pack test equipment and has begun to market time-sharing services. Proceeds, at a price to be set by amendment ($10 max.), will be used for the development of its time-sharing service and disc memory equipment, for two new branch offices to sell the time-sharing service, and for other purposes. The underwriter will be Burton, Dana, Westerlund, Inc., 120 Broadway, New York.

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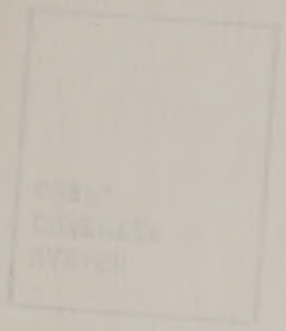

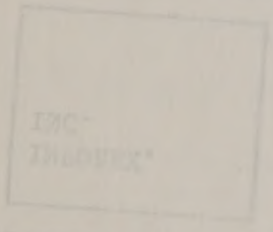

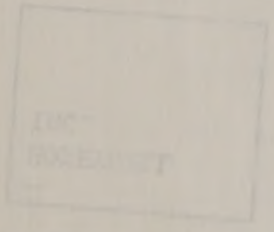

April 20, - May 1, 1970

	1970 High	1970 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	31	1234	40 3/8	31	34 1/8	- 5 7/8	-15
Amer[illegible]an R & D	99 1/2	65 1/4	2528	79 3/4	65 1/4	74	- 2 1/4	- 3
Am[illegible] Corp.	48 1/2	21 1/2	2656	25 1/2	21 1/2	22	- 1 7/8	- 8
Bunker Ramo	14 1/2	9	2178	11 7/8	9	9 3/4	- 1 7/8	-16
Burroughs	172 3/4	122 1/8	4779	140	122 1/8	129	- 3 3/4	- 3
Collins [illegible]dio	37 1/4	19 1/4	511	23 1/4	19 1/4	20 1/2	- 2 1/2	-11
Comput[illegible]ences	34 1/8	12 1/4	2781	15 7/8	12 1/4	13	- 2 3/8	-16
Control [illegible]	122 1/2	40 3/4	3867	49 1/2	40 3/4	44	- 4 1/4	- 9
Data [illegible]n. & Gen.	32	10	3521	16 3/8	10	11	- 4 7/8	-31
Electr[illegible]ssoc.	11 5/8	5 1/2	623	7 7/8	5 1/2	6 5/8	- 3/8	- 5
Gener[illegible]tric	77 5/8	67 5/8	3639	76 1/2	69 5/8	71 3/8	- 4 3/8	- 6
Honeywell	152	114 3/8	2005	127 1/2	114 3/8	119 1/2	- 5 1/4	- 4
IBM	387	286 1/4	5860	325 3/4	286 1/4	296 3/4	-25 1/2	- 8
ITT	60 1/8	46 3/8	3485	51	46 3/8	49 1/8	- 1/8	--
Leasco	30 1/2	12 3/8	3460	15 3/4	12 3/8	13 1/8	- 1 1/8	- 8
Litton	38	18 1/8	3640	22 3/8	18 1/8	18 7/8	- 3 5/8	-17
Memorex	166 3/4	78	6936	110 3/4	78	79 1/2	-25 1/2	-24
Mohawk Data Sciences	87	38 3/4	3051	47 1/4	38 3/4	41 1/8	- 3 7/8	- 9
National Cash Register	171 3/4	114 3/4	2137	130 3/4	114 3/4	121	- 4 1/2	- 4
Planning Research	53 1/4	21 1/8	1452	26 1/8	21 1/8	22 3/4	- 1 1/4	- 5
RCA	34 5/8	23 1/2	3993	27 1/8	23 1/2	24	- 2 1/2	- 9
Raytheon	33 5/8	20	1072	27 1/8	20	23 1/2	- 3	-11
SCM	24 3/4	13 3/8	1189	16	13 7/8	14 3/8	- 1	- 7
Sanders	29 7/8	12	493	14 1/4	12	13 3/4	+ 1/2	+ 4
Sangamo	29 1/8	14 5/8	573	16 7/8	14 5/8	16 7/8	+ 1/8	+ 1
Singer	85 3/4	68	971	77	68	69 3/8	-16 5/8	- 9
Sperry Rand	40 3/8	26 3/8	5011	30 1/4	26 3/4	27 3/4	--	--
Teledyne	40	16 1/2	4455	21 1/4	16 1/2	17 5/8	- 2 1/4	-11
Telex	159 1/2	82 1/8	13,235	122 3/4	82 1/8	99 1/2	-14 1/2	-13
University Computing	99 3/8	28 1/4	4403	36 1/4	28 3/8	33 5/8	+ 3 7/8	+13
Xerox	115 3/4	81 1/4	8040	88	81 1/2	85 1/2	+ 5/8	+ 1
NYSE COMPUTER STOCK AVERAGE							- 4.2	-7.8
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	4 1/8	481	6 5/8	4 1/8	5 3/4	- 1/2	- 8
Automatic D P	47 3/4	29 1/2	3018	34 7/8	29 1/2	32 1/4	+ 1 1/8	+ 4
Calcomp	33 7/8	16 3/4	2509	22 3/4	16 3/4	20 3/8	- 1/4	- 1
Clary Corp.	10 1/2	4 1/2	344	5 3/4	4 1/2	5 1/2	- 1/4	- 4
Computer Applications	12 3/8	4 1/4	436	5 3/4	4 1/4	5	- 7/8	-15
Computing and Software	75 3/4	27 3/4	1119	41 3/4	27 3/4	30 1/4	- 9	-23
DFA, Inc.	10 3/8	5	248	5 3/4	5	5 1/8	- 1/2	- 9
Data Products	25 1/2	12 7/8	1644	16 1/4	12 7/8	14 1/2	--	--
Digital Equipment	124	80 1/4	4604	96 1/2	80 1/4	85	- 5	- 6
Granite Mgt.	22 1/4	11	296	14 7/8	11	11 3/8	- 3 1/2	-23
Greyhound Computer	14 1/8	6 7/8	221	9 1/4	6 7/8	7 3/4	- 1 1/4	-14
ITEL	25 1/2	10 3/8	267	13 5/8	10 3/8	11 3/4	- 1/8	- 1
Levin-Townsend Comp.	19 3/8	4 3/4	1467	7 1/4	4 3/4	5 1/8	- 5/8	-11
Milgo Elect.	40 1/2	25 1/2	11,587	34 5/8	25 1/2	30 3/8	- 5/8	- 1
Potter Instrument	42 3/4	27 1/2	1851	35	29 1/2	33	+ 1/2	+15
Sys. Eng. Labs.	49 1/8	24 1/2	1911	31 3/4	24 1/2	25 1/2	- 3 1/2	-12
AMSE COMPUTER STOCK AVERAGE							- 1.5	- 6.8

	1970 High Bid	1970 Low Bid	May 1, Bid	May 1, Asked	2 weeks ago Bid	2 weeks net change Bid	2 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	8	2	2	2 1/2	3 1/8	- 1 1/8	-37
Bolt, Beranek & Newman, Inc.	11 1/4	6 1/2	6 3/4	7 1/2	7 1/2	- 3/4	-10
Computer Usage	8 1/2	5 1/4	6	6 1/2	5 1/2	+ 1/2	+ 9
Cyber-tronics	15	5	5	6	7 3/8	- 2 3/8	-32
Digitronics	13 3/4	7 3/4	8	9	8 1/2	- 1/2	- 6
Fabri-Tek	8 1/4	4 1/2	4 3/4	5 1/2	4 7/8	- 1/8	- 3
Informatics, Inc.	20 1/2	6 3/4	6 3/4	7 1/2	9 1/2	- 2 3/4	-29
LMC Data, Inc.	3 5/8	1 3/4	1 7/8	2 1/4	2 3/4	- 7/8	-32
Management Assistance	4	1 3/4	2	2 1/4	2 1/8	- 1/8	- 5
Optical Scanning Corp.	52	21	24	27	25	- 1	- 4
Recognition Equipment	83 1/2	26	29	30 1/2	34	- 5	-15
TBS Computer Centers Corp.	27	9	12	14	14 1/2	- 2 1/2	-17
Tally Corp.	23	11	11	13	17 1/2	- 6 1/2	-37

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" MAY 29,1970 • VOL.5,NO.15 P.J.McGOVERN,EDITOR

Merger among the dwarfs

HONEYWELL AND GENERAL ELECTRIC TO MERGE COMPUTER CAPABILITIES; NO QUESTION NOW ABOUT WHO'S NUMBER TWO

At noon on Wednesday, May 20, Honeywell and General Electric simultaneously announced an "agreement in principle" to form a new company -- to be a Honeywell subsidiary -- that will "include the present Honeywell computer operations and General Electric business computer equipment interests." Rumors of the fait accompli didn't start spreading until about 11 a.m. the day of the announcement, indicating the unparalled secrecy and extremely high levels at which the negotiations took place.

Once the announcement was made, however, everyone was talking. And by weekend, teams from GE's computer operation in Phoenix had descended on the Boston area to take advantage of the non-standard holiday weekend to sit down with their counterparts at Honeywell EDP. Sources report that these "task forces" are continuing at work, and preliminary discussions will not be a long-term, dragged out affair. And insiders foresee "absolutely no problem."

The betting among computer industry observers, however, is less positive. Comments range from: "It'll never happen," to "there may be a slight chance." The Justice Department, which so far has no comment, may likely prove the big barrier . . . not because of the possible effect on the computer industry, which is considered an increase of competition, but because formation of the new computer factor involves two of the nation's very large industrial companies. Thus, the best odds around at press time were about 60/40 against the deal.

In addition to Justice, there are other potential hang-ups. As the original announcement states, final agreement is "subject to the approval of the boards of directors of the affected companies and to receipt of any necessary government approvals." This would include the French Government, since GE's shares of Bull-GE are included, but reports to date indicate that this approval will be forthcoming so long as current levels of manufacturing and research activity are maintained in France. And U.S. sources indicate the boards will react favorably.

The proposed merger is extremely important; for one thing, it creates without doubt the Number Two company among U.S. computer manufacturers. In addition, the ramifications are broad and complex. In this issue, therefore, EDP Industry Report examines the facts pertinent to the consolidation and attempts to put them into perspective. We do this in the belief that the proposed Honeywell/GE computer consolidation is the most significant development in the computer industry yet.

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Facts of the deal . . .

As announced last week, the actual details of the proposed New Computer Company are quite simple:

- The new company -- as yet nameless -- will be managed by Honeywell, which will own 81.5% of its shares. GE will own 18.5% of the organization which, on a pro forma basis, would have had revenues of about $660 million in 1969.

- For its contribution, General Electric will receive 1.5 million shares of Honeywell common (treasury) stock and notes totaling $110 million. To avoid dilution, says Honeywell, the notes will be interest-free for one year.

- The transaction will include both domestic and international computer interests, including GE's 66% of the Bull-General Electric companies, and its 100% owned GEISI (once Olivetti's EDP operations).

- GE's time-sharing services in the U.S. and Canada, and its process computer business, are not included in the deal. The new company, however, will include GE's Datanet terminals and front-end communications processors.

. . . and other considerations

The more intangible considerations of the proposed merger are much more subjective. "The combined customer base is one of the most significant aspects of the transaction and we are dedicated to using the full resourses of both organizations to enhance customer support worldwide," says Honeywell Chairman James H. Binger. GE Chairman Fred J. Borch emphasizes that "General Electric's business-computer customers would continue to be served fully, both in terms of sales and service."

The day after the original announcement, Binger issued a statement that spells out the "specifics which relate to the short and long-term implications."

- General Electric overseas operations which account for the larger part of their computer business were profitable in 1969.

- The combining of Honeywell and General Electric's computer operations will result in important economies of scale and in the elimination of significant duplication of research and development programs.

- The $110 million in notes Honeywell will give GE are interest-free for one year.

- The transaction will virtually double the size of Honeywell's computer business world-wide and as a result we would take over unquestioned position as the second largest computer company in the world.

- Honeywell broadens its product line substantially since GE has extensive product offerings both larger and smaller than Honeywell.

- General Electric's and Bull-GE's strong market position on the European continent complement Honeywell's strong position in the United Kingdom.

- The resources of Honeywell's strong U.S. sales force can be applied to sell Bull-GE's line of small computers.

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. . . add up to Number Two

In terms of value of equipment installed, or shipments during 1969, the GE/ Honeywell combination clearly adds up to Number Two among the computer manufacturers of the world. Univac still will have more computers out, by number, than the combination (chart, page 4), but many of these are the old 1004s which are replaced at least half the time by competitive equipment (EDP/IR May 4,1970).

In terms of customer base, GE and Honeywell seem quite compatible. Within the United States, the two companies usually complement each other in various industries (chart, page 6). And abroad, the same complementary effect is true. In Britain, Honeywell has made inroads because its major non-U.S. manufacturing facility is in Scotland, and its European headquarters is in London. On the Continent, Bull has a strong base and has been successful in placing GE 400s and 600s, lines originally developed in the U.S. Still, over half its customers are small, card-oriented users who potentially can be upgraded to equipment such as Honeywell's 115.

And the Bull marketing organization handles GE equipment throughout the world, with the exception of the U.K., Italy, and Australia. French approval is considered a key to the merger's implementation, but French President Pompidou was briefed by Borch and Binger, and reports from France indicate that tacit approval has been given to the deal. France likely was promised that international operations will be run from there.

Assuming the deal goes through, Nuco (as Honeywell planners are calling the combined operation) will have great strength in Europe. In addition, the Honeywell salesmen will have a new entry in the U.S. The GE Gamma 58, developed in France, is really competitive with IBM's System/3 (EDP/IR Mar.4,1970). And Honeywell, unlike GE, is set up to move this machine within the U.S. whereas GE to date has only offered it, with no great success, in "selected" cities.

Until a new product line is introduced, naturally, GE and Honeywell will have to sell and support their present computer products. There is little overlap, and observers expect few economies of scale until the group is integrated and a new line of computers is announced. Potentially, however, there are both manufacturing and marketing efficiencies that can be expected. And the new product development effort itself could produce substantial savings, despite the work that obviously has already been done by the separate entities.

Broadened manufacturing base

For some time now, Honeywell has been concerned about its concentrated manufacturing facilities, still scattered around the Boston area where the company's computer operation started as a joint venture with Raytheon. Honeywell has wanted to diversify its manufacturing, and the deal with GE offers just the opportunity. GE has built up a worldwide group, making different types of equipment in different places, and this established, widespread capability would benefit Honeywell.

In terms of manufacturing ability, both companies are competent at quality control, production volume control, raw materials inventory, and multiple-supplier ordering techniques. GE, however, probably has developed the techniques of automated production further than Honeywell, while Honeywell appears to have a more thorough product checkout and final assembly program. Production capabilities, therefore, would seem to be complementary, and the best methods of manufacturing expertise could be spread to all plants that produce for Nuco.

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COMPUTERS IN USE, BY PRICE CLASS, FOR SELECTED MANUFACTURERS

(Distribution of general-purpose digital computers, by number, at Yearend 1969)

Price Class (Purchase Value)	Number Installed	% by Number	% by Value	Distribution of total by number				
				IBM	Univac	Hon.	GE	H + GE
COMPUTERS IN USE WORLDWIDE								
Small	16,256	23.0%	4.8%	35%	32.2%	1.2%	7.6%	8.8%
Small/Medium	18,262	25.9	11.3	77	6.2	5.6	7.8	13.4
Medium	23,597	33.4	29.4	73	2.6	6.8	2.2	9.0
Medium/Large	7,644	10.8	19.4	67	2.4	5.1	6.4	11.5
Large	3,067	4.4	15.4	73	8.1	2.9	0.5	3.4
Very Large	1,502	2.1	15.0	71	14.5	2.0	6.2	8.2
Super	176	0.3	4.7	49	0.6	-	4.0	4.0
TOTAL	70,504	100.0%	100.0%	64%	10.8%	4.7%	5.4%	10.1%
COMPUTERS IN USE WITHIN THE UNITED STATES								
Small	10,146	21.8%	4.2%	42%	31.2%	1.4%	0.9%	2.3%
Small/Medium	11,657	25.0	10.3	82	4.7	6.8	4.4	11.2
Medium	15,960	34.2	28.4	73	2.5	6.9	2.2	9.1
Medium/Large	5,297	11.4	19.2	65	1.7	5.7	6.8	12.5
Large	2,217	4.8	15.9	71	7.1	3.4	0.6	4.0
Very Large	1,160	2.5	16.6	73	11.6	2.1	6.8	8.9
Super	142	0.3	5.4	48	0.7	-	4.9	4.9
TOTAL	46,579	100.0%	100.0%	67%	9.6%	5.2%	3.0%	8.2%
COMPUTERS IN USE OUTSIDE THE UNITED STATES								
Small	6,110	25.6%	5.9%	23%	33.4%	0.7%	18.8%	19.5%
Small/Medium	6,605	27.6	13.6	70	9.0	3.5	13.9	17.4
Medium	7,637	31.9	32.0	72	2.8	6.7	2.1	8.8
Medium/Large	2,347	9.8	19.8	70	4.0	3.7	5.4	9.1
Large	850	3.6	14.2	77	10.8	1.8	0.2	2.0
Very Large	342	1.4	11.5	62	24.6	1.8	4.4	6.2
Super	34	0.1	3.0	53	-	-	-	-
TOTAL	23,925	100.0%	100.0%	59%	13.0%	3.7%	9.9%	13.6%

Price range and representative computers in the groupings shown above:

Small (Purchase price less than $125K): IBM 1130, 1401-G, 1401-H; H-110; GE 55, 58, 105; Univac 9200, 1004, 1005.

Small/Medium ($125K to $250K purchase): IBM 360/20, 1440, 1620; H-120; GE 115, 205; Univac 9300.

Medium ($250K to $500K purchase): IBM 360/25, 360/30, 1401, 1460; H-125, 200, 1200, 400, 632, 1648; GE 225, 235, 405, 410, 415; Univac 9400, 1050.

Medium/Large ($500K to $1,000K purchase): IBM 360/40, 360/44, 1410; H-1250, 2200, 1400; GE 245, 255, 265, 275, 420, 430, 435; Univac 418, File.

Large ($1,000K to $2,000K purchase): IBM 360/50, 70X, 7010, 704X, 707X; H-4200, 800; GE 440; Univac I, II, III, 49X, 1103, 1105, 1106.

Very Large ($2,000K to $4,000K purchase). IBM 360/65, 360/75, 7080, 709X; H-8200, 1800; GE 615, 625, 635; Univac 1107, 1108.

Super (over $4,000K purchase): IBM 360/67, 360/85, 360/9X, 7030; GE 645; Univac LARC.

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From a product standpoint, GE will bring terminals and a low-cost chain printer; Honeywell manufacturers disk drives and packs in addition to other standard and specialized peripherals. It also has the Keytape, an input device GE recently began marketing in Europe. Thus, the combination would provide virtually a complete line of peripherals, cutting more into Control Data's OEM sales of this equipment.

One of the potential problems in manufacturing, as in other areas, will be the question of control. Management integration must be accomplished, of course. And it is assumed that production capacity won't be cut. Thus, not many production employees should be excess. During the last two years, however, GE has added many top-level engineers and production managers, and one challenge to the new company's management will be to preserve the expertise of these people.

Marketing under the consolidation

Honeywell -- by learning IBM's marketing techniques and applying them primarily against IBM -- has developed what many consider to be the second best marketing organization in the computer industry. GE, on the other hand, has its marketing strengths in certain industries and in portions of the scientific and academic communities. Meshing the two forces, therefore, could be a strength.

There will, of course, have to be a trade-off when it comes to the market planning and marketing management personnel of the two operations. The combination, if it goes through, would appear to have excess marketing executives, branch managers, and the like, so some sort of weeding process will be necessary to produce the promised "economies of scale." A particularly thorny aspect of the situation is that many of GE's employees in this group are Honeywell alumni. Some of these, we understand, are already "sniffing" around for potential new jobs.

Likely, as soon as the consolidation is effected, there will be a hiring freeze until the new management can sort out its people and evaluate their relative degree of overlap as well as their relative strengths. GE and Honeywell have 24,000 and 23,000 employees, respectively, in their computer operations. Of more direct concern, however, are the employees in support and marketing.

EDP/IR estimates that, in the U.S., GE has over 1500 marketing employees, another 1000 or so handling customer service. The comparable figures for Honeywell -- including both its EDP and CCD operations -- are about 2600 and 1400. Abroad, GE has more such employees than in the U.S., and Honeywell fewer, giving each of them 6100 to 6200 people in computer marketing, sales, and service operations.

Sorting out the unnecessary overlap in these two operations will be one of the more challenging personnel jobs undertaken in recent history. But it will have to be done by managers who, on average, have never had to make such harsh or abrupt personnel decisions before and who are currently working under extreme pressure. Only after a few months have passed will the effectiveness of these decision makers be known.

Impact on new product lines

It looks like the season for new product announcements. Rumors are in the wind, and industry observers can chat about little else (EDP/IR May 18,1970). And in the case of Honeywell and GE, it is obvious that no true consolidation can be effected until a new product line is announced. Even the most recently introduced products from each company is based on concepts of the mid- or early 1960s.

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DISTRIBUTION OF COMPUTERS IN USE, WITHIN THE UNITED STATES, AT YEAREND 1969
(Market share, by number, based on International Data Corp.'s Domestic Computer Installation Data File)

SIC#		% of Total (By Number)	% of Total (By Value)	IBM	Univac	Hon.	GE	H + GE
13	Crude Petroleum	1.5%	2.7%	81%	5.2%	1.4%	3.0%	4.4%
1X	Mining & Const.	1.1	0.6	68	5.3	6.0	0.8	6.8
20	Food	3.0	2.0	72	9.3	6.0	1.8	7.8
27	Printing & Publ.	2.5	1.9	71	9.0	8.9	1.5	10.4
28	Chemicals	3.4	2.9	78	9.2	4.0	2.0	6.0
2X	Other Non-Dur. Mfg.	6.5	4.7	77	9.2	4.4	1.7	6.1
33	Primary Metals	2.2%	1.8%	67%	10.5%	3.2%	7.4%	10.6%
35	Machinery	4.5	4.3	67	7.4	4.8	1.2	6.0
36	Elect. Machinery	4.5	4.8	56	6.7	5.8	18.2	24.0
37	Transp. Equipment	4.4	6.6	75	7.1	6.9	4.3	11.2
3X	Other Dur. Mfg.	5.2	4.1	66	15.2	9.0	1.3	10.3
	INDUSTRIAL SUBTOTAL	38.8%	36.4%	70%	9.0%	5.8%	4.2%	10.0%
40-47	Transp. Carriers	2.7%	3.3%	73%	11.1%	3.2%	2.0%	5.2%
48	Communication	1.9%	2.7	71	9.2	5.9	1.5	7.4
49	Electric & Gas Serv.	1.7	1.8	79	2.8	3.8	2.6	6.4
50	Wholesale	4.3	2.6	70	12.5	7.0	0.9	7.9
52-59	Retail	3.5	2.7	69	9.3	5.9	-	5.9
60	Banks	7.9%	7.8%	54%	2.6%	1.0%	5.2%	6.2%
63	Insurance	5.4	6.5	80	6.7	6.7	0.7	7.4
6X	Other Financial	2.8	2.5	68	8.3	7.1	4.0	11.1
73&89	Service Bureaus	9.4%	10.1%	65%	9.7%	6.6%	3.4%	10.0%
80	Hospital-Medical	1.8	1.2	64	5.4	7.4	0.8	8.2
82	Education	6.3	6.5	81	4.8	2.7	1.6	4.3
91	Federal Government	7.5%	10.5%	42%	25.6%	5.1%	2.8%	7.9%
92&93	State & Local Govt.	4.6	4.1	66	13.0	4.2	1.1	5.3
	Others	1.4	1.3	63	15.8	7.2	0.2	7.4
	TOTALS	100.0%	100.0%	67%	9.8%	5.2%	3.1%	8.3%

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Both companies, of course, have been working on new equipment offerings, but the exact nature of either's planned product isn't known. In the case of Honeywell, at least, it is generally considered that the "obvious" will win out. Thus, the new family of computers will be designed to attract IBM System/360 users, yet contain enough characteristics so that salesmen can keep current customers as well.

This is a large design challenge, and could imply the use of system elements similar to the variable micrologic expected in IBM's NS family (EDP/IR May 18,1970). If such an approach were to be taken, it would solve not only Honeywell's previous problems of keeping present customers while attracting new ones from IBM's customer base; it would also allow the Honeywell NCS (new computer system) to emulate one of GE's current computers as well.

Such ideas -- conceptually at least -- have obviously been discussed by some of the task groups that already are about to make preliminary reports to their managements. And since new product development activity will by necessity mark time until the consolidation is given a "go" or "no-go" decision, there is another reason for rapid action. At this point in time, Honeywell is considered 12 to maybe 18 months away from a major new product announcement, GE only a little closer. So if even a 1971 announcement date is to be met, a final development direction must be established without delay.

Significance of the proposed merger

Based on the value of computer equipment installed at yearend 1969, the GE/Honeywell base would be $2.34 billion or 7.9% of all equipment built by U.S.-based manufacturers. Univac's comparable figures are $1.73 billion or 5.9%. And on a shipment basis, GE/H last year would have accounted for 8.7% of the value, as compared to Univac's 5.6%.

The real fit of the proposed merger, however, shows up when you examine the mix between U.S. and International business. In 1969, the value of GE's computer shipments was split 45/55 in favor of International; Honeywell's was 71/29 in favor of U.S. Thus, the combination would have been about 60/40 in favor of U.S. business, still above the average 68/32 split for all manufacturers. So Nuco, if it is formed, would have a business mix more in line with those of other U.S. manufacturers, but still oriented in favor of the faster growing International market.

It looks as GE, after just over a decade in the computer business, has finally decided that it can't apply its basic philosophy -- "good managers can run any business" -- to the computer industry. Either that, or it just couldn't face up to the new injections of capital that would be needed during the next few years . . . and for a business operation that did its best ever last year and only lost $5 million to $10 million, even when its European operations were profitable.

GE computer management had proposed internally that to be successful the company's computer operation should have at least 10% of the computer business by 1975. This would have required an installed base of about $7.3 billion in equipment, and would have required shipments of over $6 billion in new systems plus some $500 million for replacement of retirements. To build this $6.5 billion in equipment, even at a 20% cost of manufacturing, would have required an investment of $1.3 billion during the first half of the 1970s. Other capital demands must have been greater. So the nation's first commercial computer user has elected to bow out of the computer equipment market. It keeps it toes wet with its share of Nuco, and still has its time-sharing business here in the U.S. But it has acquiesced. And observers have started saying, "Who's next?"

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May 4, - May 15, 1970

NEW YORK STOCK EXCHANGE	1970 High	1970 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
Addressograph-Multigraph	62	27 1/2	1809	33 7/8	27 1/2	30 3/4	- 3 3/8	-10
American R & D	99 1/2	58	3668	73 1/2	58	64 7/8	- 9 1/8	-12
Ampex Corp.	48 1/2	17 1/8	3055	22	17 1/8	18 5/8	- 3 3/8	-15
Bunker Ramo	14 1/2	7 3/8	2779	9 7/8	7 3/8	8 1/8	- 1 5/8	-17
Burroughs	172 3/4	111 1/4	5276	127 1/4	111 1/4	122 1/4	- 6 3/4	- 5
Collins Radio	37 1/4	16 1/8	629	20 1/4	16 1/8	17	- 3 1/2	-17
Computer Sciences	34 1/8	10 1/8	2066	13 1/4	10 1/8	11	- 2	-15
Control Data	122 1/2	36	3727	44 1/2	36	41 7/8	- 2 1/8	- 5
Data Proc. Fin. & Gen.	32	7 1/2	1669	11 1/4	7 1/2	7 3/4	- 3 1/4	-30
Electronic Assoc.	11 5/8	5 1/8	335	6 5/8	5 1/8	5 5/8	- 1	-15
General Electric	77 5/8	64 5/8	3473	71 5/8	64 5/8	66 5/8	- 4 3/4	- 7
Honeywell	152	102 1/4	2181	118 1/2	102 1/4	106 7/8	-12 5/8	-11
IBM	387	262	6314	294 5/8	262	270 3/4	-26	- 9
ITT	60 1/8	38 7/8	10,065	49	38 7/8	42	- 7 1/8	-15
Leasco	30 1/2	11 3/4	2196	13 7/8	11 3/4	11 3/4	- 1 3/8	-10
Litton	38	16 1/2	5190	20 5/8	16 1/2	19 1/2	+ 5/8	+ 3
Memorex	67 3/4	56	9662	82	63 1/2	82	+ 2 1/2	+ 3
Mohawk Data Sciences	87	37	2001	44 1/2	37	41 7/8	+ 3/4	+18
National Cash Register	171 3/4	107	2481	125 1/4	107	111 1/2	- 9 1/2	- 8
Planning Research	53 1/4	18	1622	23 1/2	18	19 7/8	- 2 7/8	-13
RCA	34 5/8	21 1/8	4331	24 3/4	21 1/8	22 1/4	- 1 3/4	- 7
Raytheon	33 5/8	20	906	23 5/8	20 1/8	21 3/8	- 2 1/8	- 9
SCM	24 3/4	13 3/8	743	15 1/8	13 5/8	14	- 3/8	- 3
Sanders	29 7/8	10 1/8	676	14 1/4	10 1/8	12 1/4	- 1 1/2	-11
Sangamo	29 1/8	13 5/8	388	16 5/8	13 5/8	15 1/4	- 1 5/8	-10
Singer	85 3/4	63 1/8	858	69	63 1/8	64 1/4	- 5 1/8	- 7
Sperry Rand	40 3/8	24 1/2	7452	29 7/8	24 1/2	29	+ 1 1/4	+ 5
Teledyne	40	15 3/8	4536	18 1/4	15 3/8	16 7/8	- 3/4	- 4
Telex	25 7/8	13 7/8	33,770	20 3/8	13 7/8	16 3/8	- 3 1/4	- 3
University Computing	99 3/8	23 3/8	8904	35 1/2	23 3/8	26 1/8	- 7 1/2	-22
Xerox	115 3/4	75	10,517	84 1/4	75	80 3/4	- 4 3/4	- 6
NYSE COMPUTER STOCK AVERAGE							- 4.0	- 8.6
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	4 1/8	271	6 1/8	5 1/8	5 5/8	- 1/8	- 2
Automatic D P	47 3/4	25 1/2	3021	31 1/2	25 1/2	29	- 3 1/4	-10
Calcomp	33 7/8	13 7/8	2661	20 3/8	13 7/8	16 3/8	- 4	-20
Clary Corp.	10 1/2	4 1/2	154	5 5/8	4 3/4	4 3/4	- 3/4	-14
Computer Applications	12 3/8	4	199	5	4	4 5/8	- 3/8	- 8
Computing and Software	75 3/4	25 3/4	872	30 3/8	25 3/4	27 1/2	- 2 3/4	- 9
DPA, Inc.	10 3/8	4 3/8	392	5 7/8	4 3/8	4 3/4	- 3/8	- 7
Data Products	25 1/2	12 3/8	1054	14 7/8	12 3/8	13 1/4	- 1 1/4	- 9
Digital Equipment	124	68 1/8	5374	83 1/2	68 1/8	74 1/4	-10 3/4	-13
Granite Mgt.	22 1/4	9 3/8	248	11 3/8	9 3/8	10 1/8	- 1 1/4	-11
Greyhound Computer	14 1/8	6 3/8	213	8	6 3/8	7	- 3/4	-10
ITEL	25 1/2	9	634	11 3/4	9	9 3/8	- 2 3/8	-20
Levin-Townsend Comp.	19 3/8	4 1/8	740	5 1/8	4 1/8	4 1/4	- 7/8	-17
Milgo Elect.	40 1/2	23 3/4	10,788	32	23 3/4	25 1/8	- 5 1/4	-17
Potter Instrument	42 3/4	25 1/8	2590	33 3/4	25 1/8	28 5/8	- 4 3/8	-13
Sys. Eng. Labs.	49 1/8	17	2519	25 1/2	17	20	- 5 1/2	-22
AMSE COMPUTER STOCK AVERAGE							- 2.8	-12.6

OVER-THE-COUNTER	1970 High Bid	1970 Low Bid	May 15 Bid	May 15 Asked	2 weeks ago Bid	2 week net change Bid	2 week % change Bid
Aries Corp.	8	2	2	2 1/2	2	--	--
Bolt, Beranek & Newman, Inc.	11 1/4	6 1/4	7 1/4	8	6 3/4	+ 1/2	+ 7
Computer Usage	8 1/2	4 3/4	4 3/4	5 1/4	6	- 1 1/4	-21
Cyber-tronics	15	3 1/2	3 1/2	4 1/2	5	- 1 1/2	-30
Digitronics	13 3/4	5 1/2	5 3/4	6 3/4	8	- 2 1/4	-28
Fabri-Tek	8 1/4	4 1/4	4 1/4	4 3/4	4 3/4	- 1/2	-11
Informatics, Inc.	20 1/2	5 1/2	5 7/8	6 3/8	6 3/4	- 7/8	-13
LMC Data, Inc.	3 5/8	1 3/4	2 1/4	2 3/4	1 7/8	+ 3/8	+20
Management Assistance	4	1 3/4	2 1/8	2 3/8	2	+ 1/8	+ 6
Optical Scanning Corp.	52	16	17	21	24	- 7	-29
Recognition Equipment Inc.	83 1/2	26	26 3/4	27 3/4	29	- 2 1/4	- 8
TBS Computer Centers Corp.	27	8	8	10	12	- 4	-33
Tally Corp.	23	10	10	11 1/2	11	- 1	- 9

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JULY 9,1970 • VOL.5,NO.16 P.J.McGOVERN,EDITOR

Part of a half-generation

IBM INTRODUCES TWO MEMBERS OF ITS "EVOLUTIONARY" SYSTEM/370 AND SEVERAL DEVICES THAT MAY PORTEND A SECOND GENERATION IN PERIPHERALS

The news was almost "ho hum" last week when IBM called together all the important members of the computer press; but the presentation was impressive. Thomas J. Watson, Jr. himself introduced the meeting; his lieutenants described the new products; and press members asked to make sure the computer industry giant "wasn't announcing" other products or features. Francis G. (Buck) Rodgers quickly assured the audience that "No, we're not announcing" so and so.

IBM was announcing two models of what it calls System/370, and a few of the several peripherals that have been expected.

Very diplomatically, Watson led off the national press conference with an apology . . . and a promise. He admitted that the first S/360 systems "didn't work," and that the situation was "unhappy for us, and I am sure even more so for our customers." Because of this, he said, IBM initiated "Operation Recover" and straightened out System/360. "We learned from System/360," Watson said, "and we know what we are not going to do with System/370."

After this apology, Watson observed that "we have terrible trouble around here naming computers" and described the new system as being one for "the Seventies." Throughout the talks by Watson and the other IBM executives there was the conscious stress that the customer, at last, is to be first. All speakers emphasized this.

IBM announced two larger models of what it calls an "evolutionary" or transition generation of computers, and some peripherals with outstanding characteristics. All the products are "in production," and all were demonstrated via closed-circuit television. Here's a rundown on what IBM announced:

- Two processors -- the 370/155 and 370/165 -- which have fast buffer memories like the 360/85 and 360/195 and which will be upgrade processors for large 360/40s through the 360/75.

- A new disk file -- the 3330 -- which is designed to make even the 2314 a thing of the past.

- A new printer -- the 3211 -- which may represent the most important product in the IBM announcement. It runs at 2000 to 2500 lines per minute, virtually twice the speed of today's standard product.

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- A keyboard console -- the 3215 -- that operates at 85 characters per second. This is six times the speed of previous IBM offerings, and may well be the first member of a new terminal family.

The announcement relieved many tensions, but it didn't satisfy everyone's appetite. The big thing not announced was what we have previously called "variable micrologic" (EDP/IR May 18,1970). It's there in a very disguised form, and executives hinted that more will be heard about this later. But the non-announcement of this delayed IBM from offering integrated communications as expected.

Also, this means that the new systems can't currently provide "imitation" of prior computers. They do, however, have "interactive emulators" that allow programs written for second generation IBM computers to run right along with current S/360 or S/370 software in one job stream. The new computers, says IBM, are "transparent" to programs written for System/360, but they have 15 additional instructions that, among other things, will protect new program products.

It seems to EDP/IR, then, that we have so far seen only the half announcement of what has long been anticipated to be a "half generation." Many more products -- both mainframes and peripherals -- are expected to be announced by IBM from time to time during the next year or so. And considering the fact that some of the products announced so far have delivery times extending throughout 1971, we can't help but think that IBM announced as much as it dared in a hazy economic climate.

And the announcements do point clearly to at least some of the other products that can be expected. In this issue, therefore, we will both describe the products IBM did announce and project in a general way what is coming down the pike. Also, we will examine the potential effect of the new IBM products on the computer industry.

The new central processors

In a sense, the 370/155 and 165 are based on concepts already announced for the 360/85 and 195. Both the new processors use monolithic integrated circuits in their arithmetic and logic sections, and both have two-level memory systems. With such an hierarchy, relatively slow and inexpensive main memory (2 microsecond cycle time) can operate at close to the CPU cycle time because the buffer memory is very fast -- 115 nanoseconds for the 155, 80 nsec. for the 165.

This buffer memory grabs chunks of data and instructions from main memory and usually contains what is needed next in the program. It operates automatically, requires no special programming, and, says IBM, is "transparent" to the user. Thus, "the user perceives only that the computer performs as if the large capacity main storage is much faster than its rated cycle speed."

Two buffers -- of 8,000 or 16,000 bytes -- are available for the 165; an 8000-byte buffer is standard on the 155. Main memory ranges from 512,000 to over 3 million bytes on the 165, from 256,000 to over 2-million on the 155. And more channels -- the conduits through which streams of data flow back and forth to the CPU -- are available on the System/370 processors. The 165 can have up to 12 channels and a data rate of more than 8-million bytes a second (twice the rate of a 360/65); the 155 can accommodate up to six channels with a rate of 5.8-million bytes.

Both models can use block multiplexing channels, previously available only with the 360/85 and 195. This is a technique that increases system throughput by allowing "simultaneous execution of multiple high-speed channel programs." With this

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feature, several input and output devices can operate concurrently over one channel, and the computer can handle more peripherals than previously.

Built-in help for the user

Underscoring pronouncements that the user was really considered this time around, IBM listed several "helpful" features of System/370. Among them are:

- A CPU Retry characteristic that allows the computer to continue processing despite intermittent errors. An operation will be retried up to seven times before a detected error is considered uncorrectable. Also, corrected errors are logged automatically for diagnosis during scheduled maintenance.

- Error Correction Code circuits "automatically correct all single-bit errors and detect all double-bit and most multiple-bit errors."

- RETAIN/370 (Remote Technical Assistance and Information Network) allows a system specialist to use a terminal to "check out the user's system over a telephone line as if he were actually at the customer's computer console."

New standards in peripherals

In addition to announcing the two new processors, IBM also brought out some peripheral equipment that will bring new standards to computing. These new products all give more performance per dollar than their predecessors; on the other hand, each is basically a more expensive unit. The new peripherals don't have to be used with System/370 -- current equipment will work -- but they probably will be in high demand, even though initial deliveries are more than a year away . . . six months or more after CPUs are first shipped to customers:

- The 3330 disk storage device comes in dual-disk modules, each with a capacity of 200-million bytes. Disk packs are not compatible with existing products. In an eight-spindle configuration, the new drive has more than three times the storage capacity and twice the access speed (30 milliseconds) of todays's 2314 for about one-and-a-half times the cost. It can be used with 360/85s and 195s as well as with the new systems.

- The 3211 high-speed line printer operates at 2,000 lines per minute with a 48-character train, or 2,500 lines a minute with a 36-character train. This compares with 1,100 lpm on today's 1403 printer at, again, about one-and-a-half times the cost. Line spacing is handled electronically rather than with a carriage control tape. Once customer deliveries start in December of 1971, the new printer can be used with most models of S/360 as well as with S/370 machines.

- The 2305 "fixed-head storage facility" -- a head-per-track disk memory announced earlier this year for the 360/85 and 195 -- is said to be "especially appropriate" to the new computers for fast access to data used repeatedly, such as control programs and working files now generally stored on drums. Two different models give the user access to 5.4 million or 11.2 million bytes in 2.5 or 5 milliseconds, respectively. And since two drives can share a single control unit, users can have high-speed access to 10.8-million or 22.4-million bytes.

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System/370's effect on the computer industry

Although not earthshaking or revolutionary, the two announced models of IBM's System/370 give the user the sort of price/performance improvement that is to be expected in a new generation of computer equipment: The 155, with a typical rental about 1.6 times that of the 360/50, has about 3 times the power or throughput; the 165, which rents for about 3 times the 360/50, promises about 10 times the power. Each of these ratios is just a shade better than what would have been expected if Grosch's Law had been followed to the letter. The 370s effect in the marketplace, then, would seem to be as follows:

- First and foremost, the new equipment will help boost sales for IBM's aging product line. The affected models of System/360 were announced five or six years ago, and first customer deliveries were five-and-a-half years before first scheduled deliveries of the 370/155 and 165. some customers have been anticipating the announcement for several months and quite a few of those recently interviewed said they were holding off on any equipment orders until they knew what IBM would offer.

- Other mainframe manufacturers may have had orders delayed because of the effect described above, but this effect has probably been minimal in relation to the general economic condition. The 370's main emphasis is on compatibility and better price/performance for certain IBM users. Outside the current IBM customer base, the main area where System/370 might appeal would be among large, first-time users such as those setting up time-sharing services or implementing new communications-based systems.

- To third-party leasing companies, the new equipment comes as a mixed blessing. Purchase-to-rental ratios are about 48/1, so the payout situation with new customers is better than, say, with the 360/25. On the other hand, for existing customers wanting to upgrade 360/50s or 65s at the end of two- or three-year contracts, there could be a glut of 360s around in another two or three years, and prices -- as long has been anticipated -- could be forced below the 15% to 20% discount offered at present. Since IBM, however, will hardly offer 360 equipment at less than list price, the prospect for placing price-reduced 360s should not be too bad.

Prognosis

As might be expected after a major computer announcement, several companies fired out press releases claiming to be "one of the first" to order IBM's new system. One of these -- Optimum Systems Inc. of Palo Alto -- really does seem to merit claim to something. In a news release dated the same day as the IBM announcement, OSI announced that it had agreed to rent six 370/155s and six 370/165s for "expansion of the company's computer utility network throughout the U.S." It plans to pair up one of each model in six different locations, and says it will be paying IBM an annual rental of more than $15 million.

This and other hints would imply that built-in communications will eventually be announced for the 370. Certainly there will be other models, likely a 135 and a 145 renting for $15,000 and $30,000 respectively. Also in the wings are one or more virtual memory processors (based on concepts pioneered in the 360/67) -- and a memory device that uses three-inch-wide magnetic tape. We'll be seeing more.

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DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

The data listed below for Dedicated Application General Purpose Computers (Group B) is based on the best information available to the International Data Corporation, and much of it has been verified by the manufacturers. Comments or corrections should be directed to EDP/IR's census editor.

Group B computers, for the purposes of this Census, are defined as those commonly called minicomputers as well as certain larger systems usually designed or used for one dedicated application such as process control, data acquisition, or the like. These computers are word oriented, usually purchased, and predominately programmed in assembly language. They have been grouped as follows:

Class	Average System Purchase Price	No. of Models Currently Marketed
1	$ 1 - $24,999	78
2	$ 25,000 - $49,999	27
3	$ 50,000 - $99,999	22
4	$100,000 - Above	23

Of the 74 companies in this Census, 14 do not actually manufacture computers; rather, they buy processors from an Original Equipment Manufacturer and market them as shown. These firms are identified with an asterisk (*).

AS OF MAY 1, 1970

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	PURCHASE PRICE ($1,000) AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
*American Computer Technology	ACT-16	16	1	9.4			-	-	-	
	ACT-18	18	1	10.5			-	-	-	
*Analog Digital Data Systems, Inc.	ADDS-1001									
*Astrodata	ADAC	12								
Atron	501	8	1	7.5	25	9/69	65	0	65	
Autonetics	Recomp-II	40	4	95	127	11/58	20	5	25	X
	Recomp-III	40	3	65	94	6/61	7	2	9	X
Bailey Meter	756	25	4		200	11/65	27	0	27	5
	855/25	25	4	100	300	12/68	12	0	12	8
	420	18	3		98	6/64				X
*Beckman Instruments	82	12	3	32.3	62.3	8/67	32	8	40	6
Bendix Corp.	BDX-6200	20					9	0	9	X
*Business Information Technology	480	8	1	6	6.9	12/66	180	0	180	18
	483	8	1	7.7	10	1/70	90	32	122	480
Cascade Data Computer	80/20	8	2	30	50	1/70	5	0	5	5
*Cincinnati Milacron	CIP-2000	8/9	1	2.7	5	12/69		0		
	CIP-2100	8/9	1	6.2	8	7/69		0		
*Clary Datacomp	404	16	1	6.6	25	10/69	20	10	30	350
Collins Radio	8400		4		950	11/62	25	5	30	X
	8500	32	4		150	1/67	49	13	62	
Comcet	10		1		17	6/69	6	0	6	
	20	8	3		80	6/69	0	0	0	75
	40	8	4		162	6/69	4	0	4	
	60	8	4		212	6/69	6	0	6	
Compiler Systems, Inc.	CSI-16	16	1	10.7		11/69	20	0	20	80
	CSI-24	24	1	14.9		3/70	0	0	0	
Computer Automation Inc.	208	8	1	5.9	8.5	6/69	134	6	140	65
	808	8	1	4.9	8	6/68				
	216	16	1	7.9	10	9/69	99	6	105	191
	816	16	1	9.9	13	12/68				
Computer Development	CD-200	8/16	1	3.5	6	8/70	-	-	-	30
*Computer Logic	CLS-18	18	1	7.5	17	10/70	0	0	0	
Computer Signal Processor	CSP-30	8/16	3	85	100	5/70		0		
Control Data Corp.	160	12	4	60	112	5/60	49	11	60	X
	160-A	12	4	90	225	7/61	200	65	265	X
	160-G	13	4		535	3/64	35	0	35	X
	924/A	24	4		430	8/61	26	1	27	X
	1700	16	4	43	170	5/66	265	67	332	40
	8090	12	3		96	5/64	116	89	205	X
	8092	8	3		67	6/64	60	0	60	X
	G-15	29	3		61	7/55	265	18	283	X
	LGP-21	32	2		42	12/62	140	13	153	X
	LGP-30	32	3	49.5	59	9/56	290	48	338	X
	RPC-4000	32	4	87.5	101	10/60	61	12	73	X
	CSC-46	21	4		250	/54	10	0	10	X
	CSC-136	25	4		275	/60	4	1	5	X
	CSC-636	15	4		300	10/63	13	2	15	X
Data General Corp.	Nova	16	1	7.9	12	2/69	445	50	495	700
	Super Nova	16	1	11.7	16	4/70	5	0	5	200
* Data Processing International	DPI-500		3	50						
Data Technology Corp.	1600									
Datacraft	6024-1	24	4	51.4	160	5/69	8	0	8	5
	6024-3	24	3	32.8	56	2/70	11	0	11	67
Datamate Computer Systems	DM-16	16	2	14.9	26	10/69	7	0	7	6
	DM-70	16	1	8.5	20	8/70	-	-	-	
	DM-70ROM	16	1	5.9		8/70	-	-	-	
	ECP-18	18	1	13.9	15.1	11/66	21	0	21	X

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Digiac	3080	25	1	18		12/64	14	0	14	X
	3080-C	25	2	31		10/67	5	0	5	1
Digital Computer Controls	D-112	12	1	5.6	12	7/70	-	-	-	300
Digital Equipment Corp.	PDP-1	18	4	120	136	11/60	50	2	52	X
	PDP-4	18	3		74	8/62	40	5	45	X
	PDP-5	12	2	30	36	9/63	90	10	100	X
	PDP-7	18	3		66	11/64	124	36	160	X
	PDP-8	12	1	18.5	24	5/65	1192	258	1450	X
	PDP-8/I	12	1	12.8	25	3/68	1827	510	2337	360
	PDP-8/L	12	1	8.5	20	7/68	1132	318	2450	380
	PDP-8/S	12	1	10	18	9/66	1010	150	1160	180
	PDP-9	18	3	35	62	12/66	295	130	425	X
	PDP-9/L	18	2	19.9	32.6	11/68	31	10	41	22
	PDP-11	16	1	7.7		4/70	2	0	2	200
	PDP-12	12	2	27.9	35	4/69	231	65	296	220
	PDP-15	18	3	16.5	55	2/70	30	10	40	160
	Linc-8	12	2	38.5	47.5	9/66	102	40	142	X
Digital Scientific	META-4	16	3	8.7	100	4/70	2	0	2	250
Dynamic Research	DRC-44	24	3	35	51.1	12/68	3	0	3	1
EMR Computer	210	21	4	94	132	4/62	9	0	9	X
	420	42	4	324	450	6/63	3	0	3	X
	2100	21	4	65	143	12/63	8	0	8	X
	6020	24	4	71.5	176	4/65	17	0	17	X
	6040	24	4	97.5	224	7/65	8	3	11	X
	6050	24	4	122.5	360	2/66	15	4	19	X
	6070	24	4	239.5	600	10/65	3	2	5	X
	6120	16	1	7.7	25	8/70	-	-	-	
	6130	16	3	39	62	10/67	40	10	50	23
	6155	16	4	85	125	11/69	6	0	6	10
Elbit Computer, Ltd.	100	12	1	6.4		1/68	0	200	200	
Electronic Associates, Inc.	640	16	2	24.5	50	6/67	80	32	112	8
	8400	32	4		500	6/65	22	6	28	1
*Electronic Engineering Co. of California	EECO-1600									
Foto-Mem, Inc.	Centauer-100	8/16	1	7.5				0		
GRI Computer Corp.	909	16	1	8.2	10	1/70	29	1	30	300
General Automation, Inc.	SPC-8	8	1	5	10	1/68		0		
	SPC-12	12	1	5	18	2/69	500	0	500	200
	SPC-16	16	1	10	25	4/70	30	0	30	15
	GA-18/30	16	2	18	50	7/69	25	0	25	25
General Electric Co., GE/PAC	30	16	2	13	35	4/69				
	312	20	4		200	3/60	27	6	33	X
	412	20	4		300	7/62	39	8	47	X
	4020	24	4	78	200	2/67	152	47	199	50
	4040	24	4		120	8/64	45	20	65	X
	4050	24	4		280	12/66	23	1	24	X
	4060	24	4		340	6/65	18	2	20	X
	Datanet-30	18	4		270	10/63	86	8	94	X
Hetra Corp.	S-I	9	1	10.5	16					
	S-II	9	1	16	38					
	S-III	9	3	37	60					
*Hewlett-Packard Co.	2000-A	16	3	90.5	100.5	11/68	81	11	92	9
	2005-A	16	3	71.6	85	6/69	20	0	20	5
	2007-A	16	1	19.9	19.9	9/68	30	0	30	8
	2000-B	16	4	124	134	5/70	1	0	1	5
	2114-A	16	1	10.4	16	10/68	321	65	386	89
	2114-B	16	1	8.5	15	11/69	108	24	132	79
	2115-A	16	2	14.5	26	11/67	247	45	292	20
	2116-A	16	2	22	32	11/66	85	15	100	X
	2116-B	16	2	24	40	9/68	483	106	589	57
Honeywell, CCD	116	16	3		65	4/68				
	316	16	2	9.7	28	6/69				
	416	16	2	15.7	43	9/68				
	516	16	3	23.8	55	6/66				
	19	19	4		140	5/61	3	0	3	X
	24	24	4		200	5/63	84	3	87	X
	124	24	3		80	3/66	75	18	93	2
	224	24	4		380	3/65	52	8	60	X
	240	18	4		175	11/60	10	2	12	X
	610/620	24	4		180	8/63	22	6	28	X
	H-21	20	3		63	2/66	41	25	66	X
	632	32	4		240	12/68	9	4	13	7
	1648	16	4		440	6/68	19	2	21	10
IBM	1710	6	4		225	2/62	85	35	120	X
	1800	18	4		235	2/66				
	7700	18	4		300	3/64	3	0	3	X
Imlac	PDS-1	16	1	9.6	11	2/70		0		
*Information Instruments	PDQ									
Information Technology	4900/10	16	1	9.9	20	10/65	25	0	25	25
Interdata, Inc.	1	8	1	4.6						
	2	8	1	8.9	11	7/68	12	0	12	X
	3	16	1	9.3	20	5/67	170	0	170	
	4	16	2	12.3	28	8/68	90	3	93	
	5		1	12.9						
	15	16	2	17.3	40	1/69	40	0	40	

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AS OF MAY 1, 1970

NAME OF MANUFACTURER	COMPUTER MODEL	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) BASIC	AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Lockheed Electronics	MAC-16	16	1	11.2	21.6	3/69				
	MAC-Jr	16	1	7.9		9/70	-	-	-	
Micro Systems	800	16	1	2.5	6.9	1/69	120	23	143	190
Technology	810	8	1	6.4	8.3	1/69	90	2	92	125
	812	8	1	10.9	15	12/69	10	0	10	195
*Mini Comp	Multi-Term	16	3	42.9	89	9/70	-	-	-	
Monitor Data Corp.	MD-708	8	1	3.2	3.7	7/70	-	-	-	100
Motorola Instrumentation & Control	MDP-1000	8	1	6.9	18.9	6/68	40	0	40	
Multidata Inc.	Model-A	16	2	15	40	6/70	-	0	-	15
Northwest Data Systems	803	16								
	804	16								
Omnicomp Computer Corp.	Omnus-1	16	1	7	12	11/70-2/71	-	-	-	-
PDS	1020	16	2	25		2/64	100	27	127	X
Qantel Corp.	Qantel-V	8		13.9						
Raytheon Computer	703	16	1	12.7	20	10/67				
	704	16	1	9.7		3/70				50
	706	16	2	19	36	5/60				
	PB-250	22	2	33	48	12/60	108	26	134	
	PB-440	24	4		140	3/64	16	2	18	
	PB-520	24	4		128	10/65	22	3	25	
Redcor Corp.	RC-70	16	1	14.9		7/68				
	RC-77		4		111	1/70				
Rolm Corp.	1601	16	2	20	28	2/70				
Sanders	SANDAC-200	16	3		72	3/69				
Scientific Control	650	12	1	14.8	20	5/66	23	0	23	X
	655	24	3	15.9	84	10/66	137	0	137	X
	660	24	3	31	80	10/65	41	0	41	
	670	24	4	43	108	5/66	1	0	1	X
	4700	16	2	22.5	44	4/69	16	0	16	1
	DCT-132	8	2	27.9	27.9	5/69	39	1	40	25
Spear	Microlinc	12	3	46	56.5	6/66	30	3	33	3
Spiras Systems	65	16	1	12.4	20	8/69	20	0	20	50
Systems Engineering Labs	810	16	2	37.5	45	9/65	24	0	24	X
	810-A	16	3	18	90	8/66	158	4	162	
	810-B	16	4	33.5	150	12/68	59	0	59	
	840	24	3	65	80	11/65	3	0	3	X
	840-A	24	3	60	75	8/66	36	2	38	X
	840-MP	24	4	50	250	10/67		0		
	86	32	4	200	325	6/70	-	-	-	
	88	32	4	350	600	3/71	-	-	-	
TEC, Inc.	520		1	13.8						
Tempo Computers	1	16/18	1	13.8		9/69				
	1-A	16	2	24	29.6					
Texas Instruments	960	1-16	2	14.5	30	5/70	1	0	1	3
	980	16	2	16.7	40	8/70	-	-	-	3
Unicom, Inc.	CP-8A	8	1	1.8	1.9	2/70	10	1	11	50
	CP-8B	8	1	2.1	2.4	3/70	5	0	5	30
	CP-8C	8	1	3.9	4.5	3/70	3	2	5	20
	CP-8D	8	1	5.4	5.4	4/70	2	0	2	5
Unicomp, Inc.	Comp-16	16	1	9.8	20	6/70	-	-	-	4
	Comp-18	18	1	10.5	22	8/70	-	-	-	30
Varian Data Machines	520i	8	1	6	12.8	9/68	75	0	75	
	610	12	1		14.7	7/64	10	0	10	X
	611/12	12				9/65				X
	620	16	2		37	11/65	75	0	75	X
	620i	16	1	9.9	20	7/67	1160	40	1200	
	620f	16	1	11		9/70	-	-	-	
	R620i	16/18	1	16.9	25	5/69	35	10	45	
	R622i	18	1	12	20	10/67	60	10	70	
*Varisystems Corp.	PAC-16	16	1	3.8		11/69	100	0	100	
Viatron	2140	16	1	4.8			-	-	-	
	2150	16	1	9.6	16.2		-	-	-	
Victor Comptometer	820/03	64	1	12						
	820/10	64	1	10						
	820/21	64	2	25.3						
	820/25	64	2	26.6						
	820/30	64	2	29.9						
Wang Labs, Inc.	3300	8	1	4.9	15.5	8/70	-	-	-	
Westinghouse Electric	50	14	1		23.3	8/64				X
Corp. Prodac	250	16	3		62	9/67				
	510/580	18	4		110	6/63				X
	2000	16	2	10	26.6	8/69	50	-	50	100
Xerox Data Systems	CE-16	16	1	7.9	12.6	6/69				
	CF-16	16	1	14.9	25	9/69				
	Sigma-2	16	3		84	12/66				
	Sigma-3	16	4	30	104	12/69				
	92	12	3		60	4/65	60	5	65	X
	910	24	3		80	8/62	168	15	183	X
	920	24	4		116	9/62	135	19	154	X
	925	24	4		120	12/64	20	2	22	X
	930	24	4		136	6/64	140	19	159	X
							16,524	2,946	19,470	6,352

* CPU purchased OEM and marketed by company listed.

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May 18, - May 29, 1970

	1970 High	1970 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	24 3/4	1739	30 7/8	24 3/4	27 1/2	- 3 1/4	-11
American R & D	99 1/2	43 1/8	4745	65	43 1/8	54 7/8	-10	-15
Ampex Corp.	48 1/2	13 5/8	4544	18 7/8	13 5/8	18 1/2	- 1/8	- 1
Bunker Ramo	14 1/2	6 1/8	5049	8 1/2	6 1/8	8 1/8	--	--
Burroughs	172 3/4	100 1/8	7332	123 7/8	100 1/8	122 3/8	+ 1/8	+
Collins Radio	37 1/4	14 5/8	786	18 5/8	14 5/8	17 1/4	+ 1/4	+ 1
Computer Sciences	34 1/8	7 5/8	3196	11 1/4	7 5/8	10 7/8	- 1/8	- 1
Control Data	122 1/2	35 3/4	3135	41 1/2	35 3/4	38 1/8	- 3 3/4	- 9
Data Proc. Fin. & Gen.	32	6 5/8	2634	9	6 5/8	9	+ 1 1/4	+16
Electronic Assoc.	11 5/8	4 1/8	513	6	4 1/8	5 5/8	--	--
General Electric	77 5/8	60 1/4	4216	68 1/4	60 1/4	66 3/8	- 1/4	-
Honeywell	152	73	4277	106 1/2	73	88 5/8	-18 1/4	-17
IBM	387	237	8073	279 3/4	237	278	+ 7 1/4	+ 3
ITT	60 1/8	33	8718	42 3/4	33	39	- 3	- 7
Leasco	30 1/2	7 7/8	3943	11 7/8	7 7/8	11 3/8	- 3/8	- 3
Litton	38	16 1/8	5198	19 7/8	16 1/8	16 3/4	- 2 3/4	-14
Memorex	166 3/4	63 1/2	10,642	82 7/8	64 1/8	76 3/8	- 5 5/8	- 7
Mohawk Data Sciences	87	27 3/4	4542	44 1/2	27 3/4	31 1/2	-10 3/8	-25
National Cash Register	63	48 3/4	3834	56 1/2	48 3/4	56	+ 1/4	+
Planning Research	53 1/4	13 5/8	1788	21	13 5/8	20 1/2	+ 5/8	+ 3
RCA	34 5/8	20	4690	23 5/8	20	23 3/8	+ 1 1/8	+ 5
Raytheon	33 5/8	16 1/8	2009	21 7/8	16 1/8	20 1/4	- 1 1/8	- 5
SCM	24 3/4	11 1/8	1368	14 1/2	11 1/8	14	--	--
Sanders	29 7/8	9 7/8	1255	12 3/4	9 7/8	11 3/8	- 7/8	- 7
Sangamo	29 1/8	12 3/8	414	15 1/4	12 3/8	14 1/2	- 3/4	- 5
Singer	85 3/4	59	952	64 1/2	59	61 1/2	- 2 3/4	- 4
Sperry Rand	40 3/8	24 1/4	5483	28 3/4	24 1/4	28 3/4	- 1/4	- 1
Teledyne	40	14	5327	18 7/8	14	18 7/8	+ 2	+12
Telex	25 7/8	11	22,637	16 1/8	11	14 1/8	- 2 1/4	-14
University Computing	99 3/8	19 1/2	10,023	26 1/4	19 1/2	23 3/4	- 2 3/8	- 9
Xerox	115 3/4	70	9637	82 1/2	70	82	+ 1 1/4	+ 2
NYSE COMPUTER STOCK AVERAGE							- 1.8	- 3.6
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	4 1/8	325	6 1/8	4 1/4	5 7/8	+ 1/4	+ 4
Automatic D P	47 3/4	23 1/2	2812	29 5/8	23 1/2	29 1/4	+ 1/4	+ 1
Calcomp	33 7/8	13 1/8	1914	16 3/4	13 1/8	15 5/8	- 3/4	- 5
Clary Corp.	10 1/2	3 7/8	278	5 1/4	3 7/8	5 1/8	+ 3/8	+ 8
Computer Applications	12 3/8	2 3/4	774	4 5/8	2 3/4	3 1/2	- 1 1/8	-27
Computing and Software	75 3/4	18 5/8	899	27 3/4	18 5/8	27 3/8	- 1/8	-
DPA, Inc.	10 3/8	3 3/4	340	4 5/8	3 3/4	4 1/2	- 1/4	- 5
Data Products	25 1/2	7	4239	13 5/8	7	10 1/2	- 2 3/4	-21
Digital Equipment	124	57	4911	75 7/8	57	68 1/2	- 5 3/4	- 8
Granite Mgt.	22 1/4	7 3/8	535	10 1/4	7 3/8	9 3/8	- 3/4	- 7
Greyhound Computer	14 1/8	5 7/8	255	7 5/8	5 7/8	7 5/8	+ 5/8	+ 9
ITEL	25 1/2	6 1/8	948	9 3/4	6 1/8	8 3/8	- 1	-11
Levin-Townsend Comp.	19 3/8	3	3599	6 3/4	3	6 1/8	+ 1 7/8	+44
Milgo Elect.	40 1/2	15	8945	25 1/8	15	19 1/4	- 5 7/8	-23
Potter Instrument	42 3/4	23 5/8	2574	29 5/8	23 5/8	26 1/8	- 2 1/2	- 9
Sys. Eng. Labs.	49 1/8	14 1/4	5504	20 1/8	14 1/4	17 1/8	- 2 7/8	-14
AMSE COMPUTER STOCK AVERAGE							- 1.3	-4.0

	1970 High Bid	1970 Low Bid	May 29, Bid	May 29, Asked	2 weeks ago Bid	2 week net change Bid	2 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	8	1 3/4	2 1/8	2 1/2	2	+ 1/8	+ 6
Bolt, Beranek & Newman, Inc.	11 1/4	5 1/2	6 1/4	7	7 1/4	- 1	-14
Computer Usage	8 1/2	4 1/4	4 3/4	5 1/2	4 3/4	--	--
Cyber-tronics	15	2	2 1/2	3 1/2	3 1/2	- 1	-29
Digitronics	13 3/4	5 1/2	5 1/2	6 1/2	5 3/4	- 1/4	- 4
Fabri-Tek	8 1/4	3 5/8	4 1/8	4 5/8	4 1/4	- 1/8	- 3
Informatics, Inc.	20 1/2	4 1/4	5 1/4	5 5/8	5 7/8	- 5/8	-11
LMC Data, Inc.	3 5/8	1 3/4	1 3/4	2 1/4	2 1/4	- 1/2	-22
Management Assistance	4	1 5/8	2	2 1/4	2 1/8	- 1/8	- 6
Optical Scanning Corp.	52	16	24	27	17	+ 7	+41
Recognition Equipment Inc.	83 1/2	21 1/2	27	28	26 3/4	+ 1/4	+ 1
TBS Computer Centers Corp.	27	7	6	8	8	- 2	-25
Tally Corp.	23	10	12	13 1/2	10	+ 2	+20

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" JULY 27,1970 • VOL.5,NO.17 P.J.McGOVERN, EDITOR

International review issue

STRONG INTERNATIONAL MARKETPLACE SPELLS SUCCESS FOR MANY MANUFACTURERS; JAPAN, WEST GERMANY, AND U.K. ARE STRONGEST OVERSEAS BASTIONS

MINNEAPOLIS, July 20 -- Honeywell Inc. today reported record sales and earnings for the second quarter and for the first half, attributing the performance to strength in computers and good business conditions overseas. [Emphasis added]

That just about sums it up.

With domestic computer shipments heading for what looks like another flat year at best, U.S.-based computer manufacturers, privately, are thanking their lucky stars that business outside this country is booming. And, on the crest of this international computer industry wave, European- and Japanese-based manufacturers naturally are riding high.

Computer shipments in the international (outside the U.S.) marketplace are up 25% or so this year; non-U.S. revenue is probably the salvation for balance sheets at IBM and many other mainframe manufacturers (as the Honeywell statement indicates); and the international share of total profits for U.S.-based manufacturers could well exceed the 30% or so that their foreign-based business represents. These U.S. companies -- unique in that their domestic business is virtually free from foreign competition -- also dominate the international marketplace:

- U.S.-based computer manufacturers, with almost 90,000 of the nearly 105,000 computers installed in the world, have built over 85% by number and 91% by value of the $34-billion worth of computers installed.

- Of all the computers outside the U.S., almost 82% by value have been built by American-based companies. This constitutes nearly 75% of the total number of computers installed outside the U.S.

- IBM dominates the worldwide computer marketplace: Although it's on only 45% of the computers in the world, IBM's corporate symbol shows up on more than 63% of the value of all digital computers. All the IBM computers in the world, therefore, are worth almost exactly the same $22 billion as the entire computer population of the U.S. at yearend 1969.

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But enough superlatives. For every three computers in the United States, there are two outside . . . and the number outside this country is growing more rapidly than the 15% or so annual rate applicable to the domestic computer market for the 1971-to-1974 period. The international computer marketplace, therefore, is creeping up on that in the U.S., but -- for American-based companies -- revenues from abroad won't equal the domestic portion until well into the 1980s.

The single largest portion of the international computer marketplace, naturally, is Western Europe. About $1.9 billion worth of computers were installed there last year as the overseas economies bounded upward. And since 1967, computer values have grown at annual rates ranging from 22% for Belgium to 40% for the Netherlands. The average growth rate for Western Europe was 31% last year, and it will be about 25% for all of 1970.

In Japan -- where the national product increase has settled to a merely stratospheric growth of around 12% -- computers seem to be selling like transistor radios. The computer population is about the same as that of West Germany, but organizations there tend to use less expensive computers so the installed value of $1.46 billion ranks it behind Germany and the United Kingdom, where computers in use are valued at $2.22 billion and $1.53 billion respectively.

These facts and the information contained in the remainder of this issue come from a study just completed by EDP Industry Report, with the assistance of our sister publication, EDP Europa Report. The quantitative estimates in this report are based primarily on the extensive data files maintained by the International Data Corporation, publisher of both newsletters.

Computers follow wealth

From the general discussion above, and from the figures in Table I (page 4), it is quite clear that computers -- at least in the Free World -- are concentrated in areas of industrial strength. If we relate computer power to GNP, however, it is clear that even Western Europe and Japan are far from saturated with computers. In France, Italy, and Japan there are about 40 computers for every billion dollars (U.S.) of GNP; West Germany has over 45, while the Scandinavian countries have only about 25. This compares with almost 50 in Canada. The highest ratios are in the U.K., with 68, and in the United States, which has 73.

Other areas of high computer concentration show up through this kind of analysis. Australia has about 35 computers per billion dollars of GNP. Switzerland, with over 50, ranks third in the world. Such country-by-country variations in "computerization" are explained not only by the different patterns of industrial output, but also by differing economic growth rates and per-capita income levels.

Among the vast, low-income populations of Asia and Africa, there are virtually no computers. In Latin America, however -- especially in Mexico -- computer use is picking up. One reason for this, of course, is that much of the industry in these areas is owned by or influenced by American and European companies. Along with manufacturing techniques and production machinery these companies have brought in their expertise in computer use.

The Europuter?

Over the last few years, the computer industry in Europe seems trying to evolve along the philosophy expressed at the signing of the Declaration of Independence:

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"We must all hang together, or assuredly we shall all hang separately." There are, of course, problems involved in adopting this approach.

First moves in this direction have come as most of the computer manufacturers in each major European country have merged. We see this with International Computers Ltd. in Britain, Compagnie Internationale Pour L'Informatique (CII) in France, and Philips of The Netherlands. The next move in this direction should come this year with the merger into Siemens of AEG-Telefunken's large-computer interests. Each of these quasi-national companies has more-or-less received its government's blessing, assisted through "buy-domestic" policies, research grants, and loans.

In Europe, there is speculation that the ganging-up may not stop at country boundaries. Earlier this year, ICL called for a higher degree of cooperation between the European manufacturers, and if Britain finally enters the Common Market, a real move in this direction might take place. One joint project already in the winds is for development of a European supercomputer; already, Eurodata -- a consortium composed of ICL, Telefunken, CII, and Olivetti -- joined to bid on a $24 million contract for replacing IBM equipment at the European Space Research Organisation. The group lost out to IBM, but it still exists.

Two-fisted punch from the U.S.

In most of the international market, then, there is direct competition between U.S.-based companies and European manufacturers. But some export from the U.S. is technology, rather than product . . . through licensing. Siemens manufactures the RCA Spectra series and CII -- in addition to its own French-designed computers -- manufactures Sigma 2, 3, and 7 models under license from XDS.

And in the world's other computer stronghold -- Japan -- protective regulation for the domestic industry makes it difficult for foreign-dominated companies to sell directly in many segments of the computer market. Exceptions are IBM and NCR, both of which operate subsidiaries there under "grandfather" clauses. Other American companies, however, have established beachheads by setting up joint ventures with Japanese firms or by licensing existing companies to produce U.S.-designed equipment. In some cases, these arrangements provide an additional transfer of technology back to the U.S. because of development work done in Japan.

To provide a feel for the ingredients that make up the international computer marketplace, we will now take a look at both the foreign-based companies that are selling computers, and at the stance of U.S. companies overseas. Following that, we will consider the overall outlook for the international computer market.

ICL unlimits itself

The computer giant of the United Kingdom -- ICL -- is one of the first international companies to tackle the U.S. market. (A couple of Japanese companies -- Fujitsu and Hitachi -- have signed marketing and support agreements with U.S. companies.) And to broaden its market, it is making ripples in the service area:

- Barclays Bank and ICL have formed a service bureau (EDP/IR Mar.4,1970) that -- with ICL's data center operation and several thousand Barclays branches -- will be one of the largest in the U.K.

- Computer Data Systems of the U.S. has joined ICL to start up CDSIL, offering time-sharing services throughout Europe, starting in Geneva.

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TABLE I -- WORLDWIDE DISTRIBUTION OF COMPUTERS BY COUNTRY
(Estimated number and $ value of computers installed -- Jan. 1, 1970)

Country	Number	%	Avg $K Per CPU	$M Value Inst	%-Inter
West Germany	6,070	16.5	355	2,165	20.1
France	4,500	12.2	295	1,330	12.4
Italy	2,730	7.4	185	505	4.7
Netherlands	1,080	2.9	295	315	2.9
Belgium/Luxembourg	650	1.8	310	200	1.9
EEC Subtotal	15,030	40.8	300	4,515	42.0
United Kingdom	5,910	16.0	280	1,660	15.4
Switzerland	870	2.3	340	295	2.7
Scandinavia	1,520	4.1	340	515	4.8
Other EFTA	510	1.4	275	140	1.3
EFTA Subtotal	8,810	23.8	295	2,160	24.2
Other Europe	540	1.5	275	145	1.4
Europe Subtotal	24,380	66.1	295	7,270	67.6
Japan	5,900	16.0	235	1,390	12.9
Canada	3,000	8.1	310	930	8.6
Australia	925	2.5	315	290	2.7
Other International	2,730	7.3	325	885	8.2
International Total	36,935	100.0	290	10,765	100.0
U.S.S.R.	4,500		250	1,125	
E. Europe	630		295	185	
U.S.A.	62,685		350	21,925	
WORLDWIDE TOTAL	104,750		325	34,000	

- ICL is installing show-piece equipment in the U.S. . . . in New York City, where Barclays has an office . . . and in Washington, D.C., home of CDSIL's parent software company.

ICL -- a product of several mergers (EDP/IR Mar.29,1968) -- dominates the British-based general-purpose computer business. It is owned by the British government and several companies that continue to manufacture dedicated application computers. English Electric and Plessey, for example, continue to make process control computers for U.K. and export markets, and Ferranti -- another manufacturer of dedicated application computers -- early this year sold about 75% of its ICL holdings, reducing its share of the company to less than 5%.

At this time, early into the second year after ICL's final conglomeration, observers are watching to see if the company can manage a diverse, incompatible group of computer lines until a unified family is developed. For the fiscal year ended last September, ICL's revenues grew 25% to $275 million with $8 million of profit after taxes.

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TABLE II -- DISTRIBUTION, BY MANUFACTURER, OF COMPUTERS OUTSIDE THE U.S.
(Estimated number and $ value of computers installed -- Jan.1, 1970)

Manufacturer	Number	%	Avg. $K Per CPU	$M Value Inst.	%
IBM	14,310	38.7	435	6,226	57.9
Univac	3,085	8.3	235	725	6.7
GE	3,685	9.9	140	516	4.8
Honeywell	1,240	3.4	280	347	3.2
CDC	575	1.6	590	336	3.1
NCR	1,980	5.3	130	259	2.4
Burroughs	535	1.4	430	230	2.1
Other American Mnfr.	2,120	5.7	75	159	1.5
U.S. Based Mnfr. Subtotal	27,530	74.3	320	8,798	81.7
ICL	3,560	9.9	215	765	7.1
Siemens	720	1.9	375	270	2.5
Philips/NVE	195	0.5	310	61	0.6
CII	250	0.7	240	60	0.6
Other European Mnfr.	700	1.9	165	114	1.1
European Mnfr. Subtotal	5,425	14.9	235	1,270	11.9
Nippon	1,550	4.2	140	217	2.0
Fujitsu	900	2.5	210	188	1.7
Hitachi	485	1.3	345	167	1.5
Other Japanses Mnfr.	1,045	2.8	125	130	1.2
Japanese Mnfr. Subtotal	3,980	10.8	180	702	6.4
INTERNATIONAL TOTAL	36,935	100.0	290	10,770	100.0

The other international heavyweights

As mentioned earlier, the other important international computer manufacturing companies tend to be nationally oriented. In West Germany, for example, the local company with a growing share of the market is Siemens, the large electronics company. And at present, it is working out the final details of a venture with AEG-Telefunken that would combine the large-computer interests of the two, bringing AEG's TR 440 series into Siemens.

This wouldn't interfere with AEG's smaller Telefunken systems or with the dedicated application "AEG" computers which it produces under a GE license. It would, however, give Siemens strength. This company builds Spectra series computers under license from RCA -- and imports some of the equipment it distributes under its nameplate -- so would naturally like a line it can call its own.

The other countries of Western Europe have their attempts at a national manufacturer. In France, the situation is cloudy since a U.S. company (GE) gained control of the largest entry and the national conglomerate -- CII -- is not doing as well as the parliament would like. In The Netherlands there is a chance that Philips Gloeilampenfabrieken, the mammoth electronics-electrical-chemical combine, may yet develop into a bonafide producer; to date, however, it only has its P1000 series, and little has been seen of it. And in Sweden, SAAB builds some computers.

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Continued dominance by U.S. manufacturers

As the tables on the previous two pages indicate, the worldwide computer marketplace is heavily dominated by U.S.-based manufacturers and, therefore, strongly influenced by IBM. A significant portion of these companies' worldwide manufacturing -- and a growing amount of their research and development -- is performed outside the U.S., and there is a trend -- especially within IBM -- to call on foreign nationals for management as well as production personnel. The final decisions, of course, are made in U.S. boardrooms.

The international market for computers -- especially in Europe -- began long before overseas manufacturing. Then, at about the same time that foreign competition really came alive, most major U.S. manufacturers decided to build computers abroad as well as ship them from home.

As second-generation computers reached their peak production years in the early-to-mid 1960s, about 25% (by value) of new equipment shipments from U.S.-based manufacturers went to customers outside the United States. This percentage gradually started to increase in 1966, moving up a few points a year. In 1969, international shipments by U.S. companies hit the 33% level, bringing the international base of U.S.-made computers to above the 29% level.

IBM -- as the dominant force in the computer industry -- basically sets these levels, and several of the other U.S. manufacturers parallel them quite closely. During 1969, however, there were significant variations, with three U.S. companies standing out:

- General Electric, with no base to build from, bought its way into the international computer marketplace. Last year, thanks to Bull-GE and Olivetti's computer business, GE was in the unique position of being the only U.S.-based manufacturer to have a majority of shipments (55% by value) outside the U.S. This strong international footing, of course, is one of the primary reasons Honeywell would consider the merger that is pending (EDP/IR May 29,1970). If it is consummated, GE's base will be transferred to Honeywell Information Systems, Inc. (as the new venture will be dubbed) and provide it a more balanced worldwide position.

- Univac, following the more traditional approach, began marketing -- then manufacturing -- some of its computers abroad. Also, as was the case with IBM, the company had a customer base (via its Remington-Rand equipment) from which to work. It has pushed hard in the international area and, as a result, overseas shipments of the 9000 series computers and 1108s made up over 40% of Univac's 1969 shipments.

- RCA, at present, is the only major U.S. manufacturer that has not established an international marketing or manufacturing operation. Instead, it has followed the licensing path. Siemens, under an arrangement followed with British manufacturers for earlier RCA lines, manufacturers and/or markets the Spectra line in Europe. Initially, under the agreement, RCA shipped computer equipment from the U.S. and the licensee added its nameplate. Now, however, most of the produc- is abroad and RCA seems to be having second thoughts. It has started some token international activity, and more will probably follow. In all likelihood, this will gradually be developed as the company steps up production of the new computer family expected shortly.

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The other U.S.-based manufacturers have different areas of strength, but wind up with an international market share that tends to parallel the average. Honeywell, with two years of profitable international operations, is strongest in the U.K., Canada, and Australia . . . Britain, indeed, is home-away-from-home . . . so the pending GE merger will give balance. Burroughs, also, is strongest in the U.K. and Canada. During 1969 it started operating a disk memory plant in Scotland and began building B2500s and B3500s in Belgium. NCR reports that its foreign backlog is growing more rapidly than its U.S., and EDP/ER suggests that NCR poses a particular threat to the lower-priced ICL machines in continental Europe.

Control Data is in a class by itself, since the demand for supercomputers completely transcends national boundaries. Worthy of additional note: CDC has a high (15%) share of the installed base in Australia and, in total dollars, Control Data has its greatest stock of computers in West Germany. Also, lately, CDC has made moves to establish its cosmopolitan existence in other ways:

- This spring, CDC opened its fourth international Cybernet center with a 6600, and there are more to come. The fifth is scheduled for Dusseldorf, Germany. And, during the next four or five years, CDC hopes to link up centers in Australia, Germany, Italy, and Mexico City into a global Cybernet using satellite communications.

- In principle, Control Data has agreed to acquire a controlling interest in Elbit Computers, an Israeli minicomputer manufacturer that already has production and marketing agreements with XDS.

- In a software contract billed as the largest ever placed outside the U.S. by an American company, CDC negotiated development of a mathematical programming system for its 7600. The recipient -- SIA (Metra International) will also develop an advanced time-sharing system for the 6400 and other 6000 series models.

The "multi-national" computer industry

The market for computers is growing faster outside the U.S. than it is here at home and, even without an economic slowdown, this trend is likely to continue. Even if this were the only reason for expansion to worldwide markets, it would still say to companies in the computer business that they are missing a bet if they aren't adopting a "multi-national" posture.

But it isn't the only reason. Since economic conditions in other nations do not parallel the situation in the U.S. -- some lead it, some lag it, some don't even reflect its existence -- a widespread customer base is necessary if a company is to live through periods of economic stress in various parts of the world. At IBM's annual stockholders' meeting, Thomas J. Watson, Jr. put his finger on this:

> We are feeling [the domestic] economic slowdown. . . However, we have very strong orders abroad and have been able to divert some of our domestic production to fill those orders. Since we can trade orders within the limitation of import regulations we have a good deal of stability and flexibility.

Little more need be said. The computer industry is nowhere the end of its growth phase, and untapped markets abroad are even larger than those in the U.S. About the only danger lurking in the wings is the possibility of competition from overseas manufacturers.

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June 1 - June 12, 1970

	1970 High	1970 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	24 3/4	1397	31	25 1/2	26	- 1 1/2	- 5
American R & D	99 1/2	43 1/8	3580	64 1/2	53 1/2	57 1/8	+ 2 1/4	+ 4
Ampex Corp.	48 1/2	13 5/8	2476	19 5/8	17 1/8	18 1/2	--	--
Bunker Ramo	14 1/2	6 1/8	2527	9 1/8	7 3/4	8	- 1/8	- 1
Burroughs	172 3/4	100	6510	128 1/8	100	102	-20 3/8	-17
Collins Radio	37 1/4	14 5/8	661	19 3/4	14 3/4	15	- 2 1/4	-13
Computer Sciences	34 1/8	7 5/8	3383	13 1/2	10 1/2	11 1/4	+ 3/8	+ 4
Control Data	122 1/2	35 3/4	4205	47 3/4	37 3/8	41 1/4	+ 3 1/8	+ 8
Data Proc. Fin. & Gen.	32	6 5/8	4032	15	9 3/4	12 5/8	+ 3 5/8	+40
Electronic Assoc.	11 5/8	4 1/8	361	6 3/8	5	5 1/4	- 3/8	- 7
General Electric	77 5/8	60 1/4	3691	68 1/2	65	67 5/8	+ 1 1/4	+ 2
Honeywell	152	73	2601	93 3/8	88	78 5/8	-10	-11
IBM	387	237	5300	287	253 1/4	259	-19	- 7
ITT	60 1/8	33	4642	40 1/4	35 1/2	35 5/8	- 3 3/8	- 9
Leasco	30 1/2	7 7/8	3365	13 5/8	10	10 1/8	- 1 1/4	- 9
Litton	38	16 1/8	11,904	22 5/8	16 1/8	17 5/8	+ 7/8	+ 5
Memorex	166 3/4	63 1/2	6709	86 1/8	73 5/8	78	+ 1 5/8	+ 2
Mohawk Data Sciences	87	27 3/4	2558	37	29 3/4	30 1/2	- 1	- 3
National Cash Register	63	48 3/4	2607	59	48 3/4	49 1/4	- 6 3/4	-12
Planning Research	53 1/4	13 5/8	1275	20 7/8	16 3/4	17 3/8	- 3 1/8	-15
RCA	34 5/8	20	3025	24 1/4	20 3/4	21 1/8	- 2 1/4	-10
Raytheon	33 5/8	16 1/8	1037	23 1/4	20 5/8	20 5/8	+ 3/8	+ 2
SCM	24 3/4	11 1/8	802	15 3/4	13 1/8	13 1/2	- 1/2	- 4
Sanders	29 7/8	9 7/8	1147	14 1/2	10 1/2	10 7/8	- 1/2	- 4
Sangamo	29 1/8	12 3/8	441	15 3/4	13	13 1/4	- 1 1/4	- 9
Singer	85 3/4	59	717	69 1/2	61 5/8	64 1/4	+ 2 3/4	+ 4
Sperry Rand	40 3/8	24 1/4	3570	29 5/8	25 7/8	26 3/8	- 2 3/8	- 8
Teledyne	40	14	5302	20 3/4	16 7/8	17 1/4	- 1 5/8	- 9
Telex	25 7/8	11	16,383	17 1/8	13	14 3/8	+ 1/4	+ 2
University Computing	99 3/8	19 1/2	8782	29 1/2	22 5/8	25 5/8	+ 1 7/8	+ 8
Xerox	115 3/4	70	7609	84 7/8	73 5/8	76 1/4	- 5 3/4	- 7
NYSE COMPUTER STOCK AVERAGE							- 2.1	- 2.5
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	4 1/8	368	6 3/4	5 1/8	5 3/4	- 1/8	- 2
Automatic D P	47 3/4	23 1/2	1966	33 3/8	28	28 3/4	- 1/2	- 2
Calcomp	33 7/8	13 1/8	2584	21	15 7/8	17 1/2	+ 1 7/8	+12
Clary Corp.	10 1/2	3 7/8	130	5 1/2	5	5	- 1/8	- 2
Computer Applications	12 3/8	2 3/4	720	4 1/4	3 1/4	3 1/4	- 1/4	- 7
Computing and Software	75 3/4	18 5/8	928	28 5/8	22 1/4	23 1/4	- 4 1/8	-15
DPA, Inc.	10 3/8	3 3/4	422	6 1/2	4 5/8	5	+ 1/2	+11
Data Products	25 1/2	7	2704	11 7/8	9 1/4	9 1/2	- 1	-10
Digital Equipment	124	57	2579	75	67 3/8	69 1/2	+ 1	+ 1
Granite Mgt.	22 1/4	7 3/8	505	12 3/4	9	11 1/4	+ 1 7/8	+20
Greyhound Computer	14 1/8	5 7/8	125	8 1/4	6 5/8	6 5/8	- 1	-13
ITEL	25 1/2	6 1/8	1604	11 3/4	8 3/8	9 3/4	+ 1 3/8	+16
Levin-Townsend Comp.	19 3/8	3	4038	8 3/8	5 3/4	6 1/2	+ 3/8	+ 1
Milgo Elect.	40 1/2	15	6659	24 1/4	18 3/8	21 1/8	+ 1 7/8	+10
Potter Instrument	42 3/4	23 5/8	1361	30 1/2	25 1/2	25 3/4	- 3/8	- 1
Sys. Eng. Labs.	49 1/8	14 1/4	4562	20 3/8	14 3/4	17 1/4	+ 1/8	+ 1
AMSE COMPUTER STOCK AVERAGE							+ 0.1	+ 1.1

	1970 High Bid	1970 Low Bid	Bid	Asked	2 weeks ago Bid	2 week net change Bid	2 week % chang Bid
OVER-THE-COUNTER							
Aries Corp.	8	1 3/4	2	2 3/8	2 1/8	- 1/8	- 6
Bolt, Beranek & Newman, Inc.	11 1/4	5 1/2	6 1/2	7 1/4	6 1/4	+ 1/4	+ 4
Computer Usage	8 1/2	4 1/4	4 3/4	5 1/4	4 3/4	--	--
DASA Corp.	44	8 1/4	8 1/4	8 3/4	10 3/4	- 2 1/2	-23
Digitronics	13 3/4	5 1/2	6 1/2	7 1/2	5 1/2	+ 1	+18
Fabri-Tek	8 1/4	3 5/8	4 7/8	5 3/8	4 1/8	+ 3/4	+18
Informatics, Inc.	20 1/2	4 1/4	8 1/2	9	5 1/4	+ 3 1/4	+62
LMC Data, Inc.	3 5/8	1 3/4	1 3/4	2 1/4	1 3/4	--	--
Management Assistance	4	1 5/8	2 1/8	2 3/8	2	+ 1/8	+ 6
Optical Scanning Corp.	52	16	19	21	24	- 5	-21
Recognition Equipment Inc.	83 1/2	21 1/2	26 1/2	27 3/4	27	- 1/2	- 2
TBS Computer Centers Corp.	27	6 1/2	9	10 1/2	6	+ 3	+50
Tally Corp.	23	10	12 1/2	14	12	+ 1/2	+ 4

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" AUGUST 17,1970 • VOL.5,NO.18 P.J.McGOVERN,EDITOR

The plug-to-plug compatibles

INDEPENDENTS GAIN INCREASING SHARE OF TAPE AND DISK SYSTEM MARKETS

Within a few weeks, Telex will make a "major new equipment announcement which will have an impact on current 360 users and potential 370 users." This line of equipment may even include competitive models of some of the products that IBM didn't announce at its June 30 gala.

The U.S. Navy currently is weighing proposals for the "replacement of peripheral equipment subsystems." The contract -- to be awarded any day now -- will call for 427 tape drives and 109 disk drives to replace IBM equipment worth $28 million. As part of the deal, the contract must supply one- and two-hour on-call maintenance over wide geographical areas.

MAI -- with most of its leased equipment of the unit record variety -- has lost its exclusive distributorship arrangements with Potter for tape drives and Memorex for disk drives. It needs to keep its 1000-man service network busy . . . so this fall it plans to announce a group of six new computer-related peripherals for its stable.

Several independent peripheral manufacturers are switching from supplying products on an OEM (Original Equipment Manufacturer) basis and looking, instead, to sell directly to the end-user marketplace. On top of this, at least one Japanese equipment manufacturer is carefully eyeing the U.S. marketplace, looking for ways to get some of what it considers lucrative business.

Moral? Independent peripheral manufacturers are beginning to cash in on the peripheral portion of computer hardware shipments . . . doing this, primarily, with IBM plug-to-plug compatible memory equipment. And they are doing this with flair: No longer do these companies simply copy IBM equipment and hang on lower pricetags. Now, they also design in improvements.

MAI, Potter, Memorex, Marshall, Telex, and other independents have shipped about 5% to 7% of the value of the disk and tape equipment installed in the U.S. today. And over the next few years, these and other companies stand to improve this figure significantly, primarily by shipping directly to large IBM users. In this issue, we have examined what these companies are up against as they attempt to preserve and extend their share of the peripheral marketplace. The conclusions presented are based on interviews with users and suppliers of independent memory units, and on research conducted by the International Data Corporation, publisher of EDP Industry Report.

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The external memory market

With the magnetic tape drive business on the wane as compared to the entire installed base of computer hardware, but with disk drives expected to wax even stronger over the next five years, the value of external memory equipment is expected to increase from 31% of all equipment built by U.S.-based manufacturers to some 34%. In the process, however, shipments of external memory equipment will roughly double from about $2.2 billion in 1969 to the $4.5 billion level by 1974.

The non-mainframe manufacturers will ship a growing percentage of this equipment. Also, there are other trends and conclusions verified by our study:

- Disk drives are the current real source of memory market growth, and this is where competition by independents is hottest. They have designed replacements for the IBM 2311, and at present are starting to impact the larger 2314 systems. It seems certain that many independents will offer a 3330-type disk as well. In these cases, the plug-to-plug units usually provide price/performance than the IBM original.

- The current economic downturn has, if anything, produced positive effects on 360-compatible disk and tape drive shipments. Independent manufacturers report no slowdown in deliveries. This is true, primarily, because their business is not limited by new demand. Rather, it depends only on the willingness of users to send back IBM memory equipment, and/or to select the lower-priced substitute when supplementing.

- IBM's recently announced System/370 (EDP/IR July 9,1970) won't rock the boat. Current 2314 disk files can be used on IBM/370s, and the new, large-capacity 3330 file isn't due for delivery for a year or so. By then, independents probably will have similar equipment available.

The independent, end-user oriented disk and tape drive business is really in its infancy; indeed, it is still metamorphosing. By 1973, the market picture will look radically from the way it stacks up now, as the table below illustrates. The exact picture in four or five years will be the result of maneuvers now in progress by suppliers. They will be described shortly.

IBM-COMPATIBLE DISC AND TAPE MARKETS, 1967-1973, U.S. ONLY

	Indep. share of tape drives in use domestic	Indep. share of domestic disc drives	
		2311 spindles	2314 spindles
1967	neg.	none	none
1968	1.3%	0.6%	none
1969	4.0	5.0	0.2%
1970 (est.)	7.5	15.0	3.0
1973	11.7	33.0	18.0

In 1969, independent shipments of tape drive equipment and mass storage devices accounted for $95 million -- or 4.3% -- of world-wide shipments by U.S.-based manufacturers. This was just over 1% of total computer hardware shipments. Over the next four-and-a-half years, independent tape and disk shipments will gallop up to about $500 million, accounting for 11% of memory equipment shipments -- some 3.5% of all computer hardware shipments. And these numbers don't include OEM sales.

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A silver lining for the recession?

As total computer industry shipments have sagged or at least leveled off during the last year, the leading independent suppliers claim they are doing quite well with orders and deliveries of plug-to-plug compatible disk and tape drives. Some of the smaller ones report that "the economic situation squeezes everyone." After making such a comment, many of these same manufacturers report . . . "but our shipments are growing steadily."

The independents, as have been noted, are partially insulated from overall market conditions. They don't depend heavily on new demand -- with much of their added revenue coming at the expense of IBM's current rental base -- and their percent of add-on disk and tape drive shipments usually grows, even though the U.S. shipment total does not. Both suppliers and users suggest that a tight data processing budget gives users extra incentive to switch to lower-cost independent equipment, particularly in those cases where drives are rented from IBM.

For the world's largest computer user -- the Federal Government -- cost consciousness stimulated by a GAO report and Congressional prodding is finally convincing several agencies to replace IBM devices with independent plug-to-plug substitutes. The large Navy contract (see page 1) is just one example; others are in the works.

The user's reaction

In the course of this study, EDP/IR asked individual users about their data processing budgets. These two anwsers illustrate common reactions:

- [City agency with a 360/40] -- Our budget is limited and we've had a freeze on hiring. Therefore, we hope to save money by getting independent equipment [including non-memory devices]. We like our independent disk and tape drives, and we're considering more.

- [A Chicago 360/40 user] -- We're trying to keep our DP budget level, so there are more reasons for us to use independent equipment. We aren't looking at disk drives, because our 2314 is already on third-party lease. But in the tape drive area there's some real competition. We were going to install IBM 2420s, but now we're also looking at drives made by Storage Technology and Telex.

Other potential users, however, are more reluctant to "experiment" when the dollars are tight. This is particularly true for users with no experience with independent suppliers, or for those with bad experience. These users opt for the guaranteed service, performance, and higher pricetag that IBM offers, rather than for the uncertain glories or the disasters which might result from "plug-to-plug compatible" independent hardware. This comment clarifies this position:

- [A 360/25 user from New Jersey] -- I've had some bad luck with the service on my independent disk drives, so I'm going to use IBM's after all. The CEs were arguing about where the bugs were. I don't have much leeway in my budget right now, so I can't risk more problems with independents, although I may try out some off-line equipment.

It should also be pointed out that, in the course of talking to users, EDP/IR found that a considerable number of them just weren't feeling budget pressures.

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Effects of System/370

The announcement of IBM's System/370 -- which included a high-capacity 3330 disk file -- has caused users and independent suppliers to think twice, but the short-run impact on current disk products would appear small. For one thing, IBM gave both a pleasant surprise when it said that the new mainframes would be channel-compatible with the 2314 disk system. Therefore, users upgrading to the 370 will not be forced to get rid of their third-party leased or independent disk drives.

Of course, the trickle of 370 deliveries in early 1971 will start to become a deluge within a year after that. Along with this will come significant deliveries of the 3330 by early 1972. This will then be an important market to the independents, so it would appear appropriate that they announce a compatible product by early 1971, with deliveries scheduled for no more than 12 months later.

If the independents are too slow, they will certainly lose business back to IBM . . . business they previously captured with their plug-to-plug compatible version of the 2311 or the 2314. In fact, some already have seen business go by the board because they weren't into the marketplace fast enough with a 2314. Telex, for example, first began shipping such a system in April of this year, and Memorex started deliveries only in June.

The effect of not having a 2314-compatible drive was clear during our recent survey when we talked to users of MAI and Marshall 2311-type drives. IBM seems to be regaining ground with these people. Here is what some of them said:

- [360/30 user from Portland, Oregon] -- We replaced our Marshall disk drive with an IBM 2314. We're going to order the Memorex disk drive, but it wasn't available at the time we decided to upgrade.

- [Small Wisconsin user] -- We had some MAI disk drives, but we had to go back to IBM for the 2314. Maybe after the new Memorex units have been around awhile we'll order some, but not right away.

- [Large East Coast public utility] -- We're saving money like crazy with our Potter tape drives, but we'll stick with IBM when we replace our 2311 disks with 2314s. I don't have time to evaluate independent drives now, although I may use independent disks eventually.

Maintaining good relationships

The old bugaboo about multi-vendor conflicts is still bugging a lot of users. "You need traffic lights to keep them straight!" was one complaint. The problem is not in the willingness of the different customer engineers to cooperate, most report, rather, it is in locating problems in the first place. Then, the users tell us, you also have to allot each CE working and storage space. Other comments:

- [Service bureau with a 360/30] -- We have a Marshall disk drive, plus some IBM ones. We surely don't plan to get any more independent ones. We simply can't afford the extra down-time while IBM and Marshall decide where the problems are.

- [Medium-sized bank] -- We're happy with our MAI tape drives, but we have IBM drives on order. We certainly won't get Potter tapes because that would introduce a third maintenance force.

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As the above examples would imply, most users have some sort of idea what the critical mass of CEs should be. Installations willing to put up with two maintenance teams may not tolerate a third. Or, three teams may be the upper limit. In any event, it seems quite clear that, to many users, the only thing more dreadful than not having enough CEs around a computer center is having too many.

Today, however, users seldom have more than one supplier of on-line independent equipment, even though they may have several types of equipment such as tape drives, disk drives, or printers. This attitude, therefore, encourages the supplier of independent peripherals to handle several items . . . all through the same salesman and all serviced by the same CEs.

The three leading independents today have gone the furthest in this direction -- MAI, Potter, and Telex, all of whom distribute both tape and disk drives. And MAI has gone even further: Although it only distributes and services independent peripherals, it has purchased outright, and added its nameplate to, much of its equipment.

Interplay among the major competitors

During the last year, both Potter Instruments and Memorex have been pulling away from MAI, which until then had marketed and serviced their plug-to-plug compatible tape and disk equipment exclusively (see below). Now, MAI users are being forced to make what may be a soul-searching decision between staying with familiar equipment or staying with familiar salesmen and CEs, as MAI makes the transition and begins marketing 2314-type disks and tape drives from different suppliers.

In the meantime, Potter and Memorex will have the responsibility for wooing away customers from MAI as well as actively seeking new customers. During this interplay among the leading suppliers, new companies are coming onto the scene. Calcomp is moving away from the plotter field and into memory equipment built by its Century Data Systems; Telex and Ampex are shifting emphasis to include equipment in the disk memory field. At the same time, the competitors are adding other types of peripherals to their line so that they can place emphasis on customer contacts and service networks.

LEADING COMPANIES IN THE INDEPENDENT MARKET FOR EXTERNAL MEMORY EQUIPMENT

Since the market for plug-to-plug memory equipment from independent sources is expected to have significant growth during the next several years, we now present a rundown on the major companies presently competing in this marketplace. The comments here are based on interviews with the companies themselves plus research conducted by IDC. Here's a company-by-company rundown at mid-1970:

Management Assistance Inc.

About the time of this fall's JCC, MAI -- the leading supplier of independent peripherals -- says that it will introduce six new products. One of these will be a 2314-type disk drive, to be obtained from an as yet unnamed manufacturer. Another of the products is to be a high-speed (2420-type) tape drive. In marketing these products, MAI will go into direct competion with its former suppliers.

In addition, there is the possibility that other peripheral manufacturers will market their products while contracting with MAI for service. In this move into third-party maintenance, MAI will compete against mainframe manufacturers such as Honeywell and RCA as well as new organizations such as SirVess and Comma.

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Potter Instrument Company

Potter has many irons in the fire. For one thing, it is enthusiastically trying to build up an end-user market for its peripherals, which include IBM plug-to-plug compatible tape drives and a 2314-type disk system. To this end, the company set up two subsidiaries during July: One will lease peripherals, the other will service them.

Potter claims to be the largest manufacturer of independent peripherals. For one thing, it supplied the tape drives with which MAI captured about half of the plug-to-plug compatible market. In its third quarter earnings statement, through March 31, the latest available, Potter reported a good increase in sales and profits, not counting the $1 million it will have to pay MAI in exchange for ending the latter's exclusive rights to market Potter tape drives. A company spokesman says that, despite the current industry slump, Potter's sales have continued to increase. He concludes, as pointed out earlier, that the slowdown does not hurt the market for plug-to-plug compatible independent peripherals, and may even help it.

Memorex

Last June, Memorex started delivering its 2314-type disk system (the 3660) to end-users. A company spokesman reports that the disk system is moving well. Also, he says, the drive is not primarily a replacement for the 2311-type built by Memorex and distributed by MAI. Memorex -- like Potter -- has terminated MAI's exclusive rights to distribute its disk files and has plunged into a direct end-user marketing effort.

Memorex's road into the equipment field, of course, is through its position as a major supplier of computer tape and disk packs. And it seems to be successful with this approach. Latest reports are that equipment -- not supplies -- currently accounts for more than half the company's revenue.

Continuing this approach, Memorex plans to increase its penetration of the independent equipment market. A COM recorder -- also moving well according to marketplace reports -- is out, and Memorex will be introducing several communications terminals. It thinks that communications and data-based peripherals -- such as the new COM unit and the terminals -- should move even better because of IBM's 370. The company's revenues for the first six months of 1970 were healthy, with an increase of 34% over the comparable period last year. And one-third of this came from the booming international market (EDP/IR July 27,1970).

Marshall

Marshall Data Systems, a division of Marshall Industries, manufactures, markets, and services its line of 2311-type disk drives. By the end of this year, it will begin deliveries of a 2314-type drive, already in production. With a base of several hundred 2311-type users (second only to that of MAI), "upgrade" seems to be the prospect for immediate growth. The company also sells equipment OEM, but like the other large independents, it is emphasizing direct end-user marketing.

At first glance, the new Marshall disk system would seem merely to plug a leak in its product line. A company official, however, says the unit contains technology that effectively leapfrogs the IBM counterpart. This is often the case with independent equipment. This prospect (as well as assurance that a larger disk memory was coming) has given Marshall salesmen continuing success with 2311-types.

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Telex

In addition to hinting that it will compete against IBM's newest peripherals, Telex's Computer Products Group is casting about for other entries in the plug-to-plug marketplace. Sometime this fall, for example, it plans to announce a high-speed printer . . . again, perhaps, jumping onto the System/370 bandwagon.

Telex already has a small, but growing, percentage of disk-drive customers, since it now markets a 2314-type drive made by Information Storage Systems (itself well-stocked with ex-IBMers). And it has a fertile base for disk drive sales, because it has supplied about 45% of the independent tape drives now installed.

PROSPECT FOR INCREASED COMPETITION IN PLUG-TO-PLUG DISKS

With disk drives the most exciting portion of the external memory field, it's no wonder that other competition looms on the horizon. Here's a rundown:

- The Bryant Computer Products Div. of Ex-Cell-O Corp., a machine tool manufacturer, currently markets the 2311-type disk drive manufactured by Linnell. No 2314-type drive has been announced, but one could be expected. To date, most of Bryant's memory business has been to the OEM market.

- Singer Co.'s Friden Div. has steadily been wading into computer hardware, a fact best illustrated by its recent advertising splash over its System 10. The company has been delivering a 2311-type disk drive (through its Talcott Div.) since last April, but it has no plans to offer a 2314-type product anytime soon.

- This month, Calcomp's Century Data Systems subsidiary signed a contract under which BASF Systems agreed to buy $10 million worth of Century's disk memory systems over a one-year period. This follows a recent $9.8 million contract with Randolph Computer. This type business is growing rapidly, and Calcomp expects its memory business eventually to overshadow its plotter business.

- Hitachi America, which distributes for the Japanese computer manufacturer, Hitachi Ltd., showed a 2314-replacement disk, along with Hitachi's minicomputer, at the 1970 SJCC. It has been selling the 2314-replacement OEM in Japan since 1969, but no 2314- or 2311-type drives have been installed at customer locations in the U.S. Hitachi is currently considering a distribution agreement with an American company for its memory equipment.

- Ampex, a supplier of computer tape and a manufacturer of tape drives and other memory products, is also poking its nose into the disk drive area. It recently purchased Clasco, Inc. from Computer Learning and Systems Corp. This new acqusition has developed -- but not yet put into production -- a 2314 replacement.

With all this present and potential competition, the question naturally arises: "What might IBM do about this?" The answer is probably simple: "Nothing!" So long as the independents' penetration remains relatively small -- and 16% domestically by 1973 is still small -- IBM probably is pleased. Don't forget, IBM encourages competition. It even advertises the fact that it does.

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June 15, - July 31, 1970

NEW YORK STOCK EXCHANGE	1970 High	1970 Low	7 week Sales in 100's	7 week High	7 week Low	Last	7 week Net Change	7 week % Change
Addressograph-Multigraph	62	21	3365	28 1/2	21	26 7/8	+ 7/8	+ 3
American R & D	99 1/2	37 1/8	11,655	63 7/8	37 1/8	41 1/8	-16	-28
Ampex Corp.	48 1/2	13 5/8	6114	20 7/8	14 7/8	15 3/8	- 3 1/8	-17
Bunker Ramo	14 1/2	6 1/8	4603	8 5/8	6 1/4	7 1/2	- 1/2	- 6
Burroughs	172 3/4	78 5/8	17,560	111	78 5/8	96	- 6	- 6
Collins Radio	37 1/4	9	6171	15 1/2	9	11 1/4	- 3 3/4	-25
Computer Sciences	34 1/8	6 7/8	15,776	12 3/4	6 7/8	7 1/8	- 4 1/8	-37
Control Data	122 1/2	28 3/4	9924	44 1/8	28 3/4	32 1/8	- 9 1/8	-22
Data Proc. Fin. & Gen.	32	6 5/8	4118	13 1/2	8	8 1/2	- 4 1/8	-33
Electronic Assoc.	11 5/8	3 5/8	694	5 1/2	3 5/8	4 1/4	- 1	-19
General Electric	78	60 1/4	11,792	78	67	76 7/8	+ 9 1/4	+14
Honeywell	152	65 5/8	8394	81 7/8	65 5/8	77 1/2	- 1 1/8	- 1
IBM	387	237	14,053	275 3/4	242	252 1/4	- 6 3/4	- 3
ITT	60 1/8	30 1/2	32,914	39 3/8	30 1/2	38 7/8	+ 3 1/4	+ 9
Leasco	30 1/2	7	7520	11 1/2	7	9 1/4	- 7/8	- 9
Litton	38	15 3/8	18,369	20 5/8	15 3/8	16 1/2	- 1 1/8	- 6
Memorex	166 3/4	48 1/8	20,086	88 3/8	48 1/8	48 1/8	-29 7/8	-38
Mohawk Data Sciences	87	19 1/4	7262	33 3/4	19 1/4	19 1/2	-11	-36
National Cash Register	63	32 1/2	13,541	53 1/4	32 1/4	34	-15 1/4	-31
Planning Research	53 1/4	13 5/8	2921	20 1/4	14 5/8	16	- 1 3/8	- 8
RCA	34 5/8	18 1/8	13,157	24 1/8	18 1/8	23	+ 1 7/8	+ 9
Raytheon	33 5/8	16 1/8	3919	24 1/2	17 5/8	18	- 2 5/8	-13
SCM	24 3/4	11 1/8	1844	14 1/4	11 1/4	13	- 1/2	- 4
Sanders	29 7/8	7 1/8	2736	11 1/2	7 1/8	9 7/8	- 1	- 9
Sangamo	29 1/8	9 1/8	1457	14 1/2	9 1/8	13 1/2	+ 1/4	+ 2
Singer	110	69	4517	72 1/2	62 1/4	72 1/2	+ 8 1/4	+13
Sperry Rand	40 3/8	22 5/8	12,528	28 1/2	22 5/8	23	- 3 3/8	-13
Teledyne	40	13	12,335	18 1/2	13	15 1/4	- 2	-12
Telex	25 7/8	11	42,622	16 1/2	11 1/2	12 1/4	- 2 1/8	-15
University Computing	99 3/8	19 1/2	14,521	28 3/8	20	20 1/8	- 5 1/2	-21
Xerox	115 3/4	69 3/4	23,437	81	69 3/4	72 7/8	- 3 3/8	- 4
NYSE COMPUTER STOCK AVERAGE							- 3.6	-11.8
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	4	560	6 1/4	4	4	- 1 3/4	-30
Automatic D P	47 3/4	23 1/2	4522	33 3/4	27 3/8	32	+ 3 1/4	+11
Calcomp	33 7/8	13 1/8	4703	20 3/8	13 5/8	14 1/4	- 3 1/4	-19
Clary Corp.	10 1/2	3 3/8	414	5 3/8	3 3/8	3 7/8	- 1 1/8	-23
Computer Applications	12 3/8	2 5/8	823	3 3/4	2 5/8	2 3/4	- 1/2	-15
Computing and Software	75 3/4	16 1/4	3443	26 3/4	16 1/4	22	- 1 1/4	- 5
DPA, Inc.	10 3/8	3 3/8	620	5 3/8	3 3/8	3 3/4	- 1 1/4	-25
Data Products	25 1/2	7	4717	10 5/8	7 1/8	7 1/8	- 2 3/8	-25
Digital Equipment	124	48 3/4	9185	77 3/8	48 3/4	53 1/2	-16	-23
Granite Mgt.	22 1/4	7 3/8	667	13	8 3/8	10 1/4	- 1	- 9
Greyhound Computer	14 1/8	5 5/8	346	7 3/8	5 5/8	6 1/8	- 1/2	- 8
ITEL	25 1/2	6 1/8	1481	11	8	8 5/8	- 1 1/8	-12
Levin-Townsend Comp.	19 3/8	3	1807	7 1/4	3 3/4	4 1/4	- 2 1/4	-35
Milgo Elect.	40 1/2	15	10,533	24	16 1/2	21 1/2	+ 3/8	+ 2
Potter Instrument	42 3/4	14 5/8	4586	27 1/4	14 5/8	17 1/4	- 8 1/2	-33
Sys. Eng. Labs.	49 1/8	10 1/8	5794	19 1/4	10 1/8	13 1/4	- 4	-23
AMSE COMPUTER STOCK AVERAGE							- 2.6	-17.0

OVER-THE-COUNTER	1970 High Bid	1970 Low Bid	July 31 Bid	July 31 Asked	7 weeks ago Bid	7 week net change Bid	7 week % change Bid
Aries Corp.	8	1 3/8	1 1/2	1 7/8	2	- 1/2	-25
Bolt, Beranek & Newman, Inc.	11 1/4	5 1/2	6 1/4	7	6 1/2	- 1/4	- 4
Computer Usage	8 1/2	2	2 3/4	3 1/4	4 3/4	- 2	-42
DASA Corp.	44	3 3/4	5 1/8	5 1/2	8 1/4	- 3 1/8	-38
Digitronics	13 3/4	5 1/4	5 1/4	6 1/4	6 1/2	- 1 1/4	-19
Fabri-Tek	8 1/2	3 5/8	4	4 1/2	4 7/8	- 7/8	-18
Informatics, Inc.	20 1/2	4 1/4	4 1/2	4 7/8	8 1/2	- 4	-47
LMC Data, Inc.	3 5/8	1 1/4	1 3/8	1 3/4	1 3/4	- 3/8	-21
Management Assistance	4	1 1/4	1 1/2	1 3/4	2 1/8	- 5/8	-29
Optical Scanning Corp.	52	15 1/2	17	18 1/2	19	- 2	-11
Recognition Equipment Inc.	83 1/2	15 1/4	15 1/4	15 3/4	26 1/2	-11 1/4	-42
TBS Computer Centers Corp.	27	6	8	9 1/2	9	- 1	-11
Tally Corp.	23	10	12 1/4	13 1/4	12 1/2	- 1/4	- 2

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" AUGUST 31,1970 • VOL.5,NO.19 P.J.McGOVERN,EDITOR

Big question in the marketplace

AS THE COMPUTER INDUSTRY GOES THROUGH AN EVOLUTIONARY PERIOD, RCA REPRESENTS THE BIGGEST "IF" AMONG POTENTIAL MAINFRAME MANUFACTURERS

For the first time in the relatively short history of the computer industry, a mainframe manufacturer has pulled off a high-level raid on IBM management. In doing so, RCA has indicated its intent to actually become an important factor in the computer marketplace of the 1970s. The electronics giant thought about pushing heavily into the computer industry during the early 1960s, but finally gave real corporate support to color television. That worked. Now, it indicates that its financial muscle during the 1970s will be applied to data processing.

As it starts out to prove the wisdom of this decision, RCA is embarking on a rocky road. The challenges it faces seem to evolve around three big question marks:

?? Can an "imported" top management, groomed in the IBM philosophy, but without IBM's restraints, transfer its thinking down the chain of command to the thousands of salesmen in the field;

?? With a strong commitment to virtual memory computers and more models set for announcement within a few weeks, can RCA's expanded marketing force sell a fairly new concept to the 11,000 IBM 360/30 and 360/40 users for whom at least one New System is designed;

?? In the face of its goal of becoming Number Two in the domestic computer market, can RCA change its strategy and tactics to grab its appropriate share of the international computer market (EDP/IR July 27,1970) which will continue to grow more rapidly than the U.S. market.

The answers, of course, will only come with time. But with a four-man management team that elected to move away from secure positions at IBM, RCA has one of the biggest plus factors ever going for any company trying to impact the computer industry. These people know IBM's corporate thinking, and are trying to transfer it -- without Justice Department restraints -- to another potential force in the field.

E.G. Donegan, who heads RCA's Information Systems Division, was brought into RCA by Robert W. Sarnoff, himself, and has been given the responsibility for making the company an important factor in the computer business. Along with the responsibility, Donegan essentially has a blank check approaching 10 digits . . . about the amount it would take any company -- starting from a base of about $1 billion as 1970 began -- to achieve the goal of 10% of the U.S. computer market by 1975.

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Realizing the possible importance of RCA's momentous decision to increase its market penetration at this rather late date in the development of the computer industry -- especially in an atmosphere of depressed domestic shipments and General Electric's withdrawal from the mainframe marketplace (see page 6) -- EDP Industry Report has taken a careful look at the existing situation and at the possible outcome. After talking with key RCA executives, after discussing with competitors the probability of RCA's success, and after a careful analysis of the Computer Installation Data Files maintained by the International Data Corporation, the publisher of EDP/IR, we have prepared this overview and prognosis of RCA's potential in the computer industry. The facts speak for themselves; the interpretations and projections are based on the best information available.

From then to now

RCA jumped into the computer game early -- way back when the machines had names rather than numbers. It installed its first computer, the Bizmac, in 1956 . . . later than the UNIVAC I, to be sure, but well before Honeywell had introduced its first product, the DATAMATIC 1000. The solid-state 501 came in mid-1959 . . . one full year before and at only one-fourth the price of IBM's first transistorized entry, the 7090, in mid-1960.

But if there ever was a question as to the future of the computer industry, it was answered in the fall of 1960 when IBM delivered the first 1401. This computer essentially became the Model T of the information processing era, proving that almost any decent-sized business could have its own electronic marvel. RCA had its 301 -- its single most popular machine until this year -- in the works, and started deliveries only months later. But the deck was already stacked.

By mid-1966, when RCA was edging up on the total of about 650 installations for its 301, IBM had already introduced System/360 but was still shipping 1401s. Before IBM stopped production on this "standard" computer, it had installed about 10,000 of them at user locations around the world, and in the process had about 75% of the $5 billion worth of computers in the world.

RCA announced its Spectra/70 family . . . a few months behind but compatible with IBM's new equipment. But the thrust just wasn't there. The company decided that its future during the 1960s was in color television, and this decision paid off. Now, according to Donegan, "RCA has made a definite decision that computers are its priority business." This change in thinking coincides with "young Sarnoff" taking over the reins of the company his father built from whole cloth. The company has a different set of priorities.

Donegan describes his goals -- set by Sarnoff -- as follows:

- Be the Number Two computer company, domestically, by 1972;
- Have 10% of the domestic computer business by 1975.
- A third goal, implied if not directly stated, is to "look on the world as the market."

The road to these goals is not smoothly paved. The first could now be especially difficult in the light of the almost-certain merger of GE's computer interests into Honeywell; the second implies an annual growth in shipments of 18% to 20%, several points above the average expected for the industry; the third almost promises an intimate relationship with -- or acquisition of -- Siemens' computer interests.

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Where things stand

It has been over a year-and-a-half, actually, since RCA started down its "road to revival" in the computer industry. Early in 1969, Donegan left his post as vice president of Service Bureau Corp. to join RCA. He had moved from IBM proper to SBC in the fall of 1968 (EDP/IR Oct.30,1968) when the industry giant's time sharing operation was transferred to its subsidiary.

During much of last year, Donegan concentrated on putting together a "fresh crew of management" . . . eight key people recruited from IBM, plus another 30 ex-IBMers who have come to RCA. During 1969, however, RCA computer equipment shipments slipped a bit as the entire U.S. mainframe industry toted up no increase in shipments. There was concern in several quarters that the management shuffling was a last gasp effort and that RCA would gradually phase out of the computer business.

But that's not the way RCA is thinking. Just like the company that provided their computer industry education, RCA's new managers are talking growth. And, says Donegan, "we are starting to put our money where our mouth is." This year, in fact, the company reports that worldwide shipments will be up more than 20% over 1969. What's more, this growth will be in the domestic market, where total shipments are expected to be less than they were last year.

This 1970 growth of 29% domestically would put RCA right on target for meeting the goals described earlier (page 1). Growth in domestic shipments will have to be in the 25% to 30% range during the first half of the 1970s for the company to achieve 10% of U.S. shipments by 1975. Growth this year will be about 60% from the present customer base (see table, page 4) with the other 40% coming from first-time users or from the competition.

Analysis of current customers

The tables on pages 4 and 5, in fact, give a good picture of RCA's present strengths and weaknesses. Over half the company's installed base, worldwide, is composed of second-generation computers. This $570 million worth of equipment is obviously a candidate for upgrade during the next few years, and RCA will naturally attempt to keep these customers in its fold.

Some 15% of these second-generation computers (almost 9% of RCA's total installed base) in the U.S. are installed within companies in the communications industry, primarily telephone operating companies. This is an area where RCA plans to continue to concentrate . . . going after communications applications in other industries. As a company spokesman says: "Our bag is communications. RCA has more expertise in this area than any other manufacturer, and we intend to capitalize on it." All marketing people are being given special training in this area.

On the other hand, the company also plans to concentrate on certain areas where it currently is weak. The proportions of RCA computers installed in education and medical applications are only 30% to 40% of the industry averages by number. The company considers these to be strong growth areas, however, and plans to concentrate more effort in them.

Other weaknesses, as the table shows, are non-durable manufacturing (especially food), machinery manufacturing, and the wholesale-retail field. One of RCA's stronger areas traditionally has been state and local government. Here, it has offered better pricing plans (a five-year lease rate on a one-year contract, for example) than some of the other manufacturers.

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WORLDWIDE DISTRIBUTION OF RCA COMPUTERS
(Based on EDP/IR Census information as of Jan. 1, 1970)

Model	Date of First Installation	Number Installed* U.S.	Non-U.S.	Total	System Value	Value Installed ($M) U.S.	Non-U.S.	Total
301	Feb. 1961	335	225	560	$ 340K	$119	$ 76	$ 195
3301	July 1964	80	8	88	850	68	7	75
501	June 1959	63	2	65	630	40	1	41
601	Nov. 1962	5	0	5	1575	8	-	8
SUBTOTAL		483	235	718		$235	$ 84	$ 319
Spectra 70/15	Sept. 1965	65	120	185	$ 200K	$ 13	$ 17	$ 30
Spectra 70/25	Sept. 1965	25	52	77	325	8	12	20
Spectra 70/35	Jan. 1967	175	194	369	495	86	82	168
Spectra 70/45	Nov. 1965	317	162	479	945	300	107	407
Spectra 70/46	Nov. 1968	36	1	37	1620	51	2	53
Spectra 70/55	Nov. 1966	24	13	37	1575	38	21	59
Spectra 70/60	Sept. 1970	-	-	-	1710	-	-	-
Spectra 70/61	Feb. 1971	-	-	-	2480	-	-	-
SUBTOTAL		642	542	1184		$496	$241	$ 737
TOTAL		1125	777	1902		$731	$325	$1056

* Many Spectra systems installed abroad carry Siemens nameplate

Expected new equipment

About the middle of September, RCA is expected to announce several new computer models. An examination of public statements coupled with an analysis of the company's existing product line (table above) provides some clues at what might be expected at this time.

For one thing, RCA says that it needs a broader product line, one that has "at least 80% of IBM's scope." For another, it is heavily committed to virtual memory computers . . . computers such as its Spectra 70/46 and 70/61 -- and IBM's 360/67 -- that appear to have memories far larger than they actually have. With these machines, users essentially have unlimited memory capacity.

It would seem to EDP/IR, therefore, that the following computer models could be announced by RCA. The numbers suggested are based on the assumption that the company will use these computers to extend its Spectra series into the mid-1970s, at which time a family of New Technology Systems will be introduced:

- Spectra 70/16, 70/26, and 70/36. These computers would be virtual memory extensions of current models, with rental prices about 1.2 to 1.7 times the existing 70/15, 70/25, and 70/35. The lower two models are already in the Siemens product line.

- Spectra 70/70. This larger model of the Spectra family would likely rent for $70,000 to $80,000 a month and be competitive with a large IBM 370/155 or a small 370/165.

- Spectra 70/71. This would be a virtual memory companion to the 70/70 (much like the 70/61 is to the 70/60) and would probably rent in the range of $90,000 to $100,000 per month.

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ANALYSIS OF RCA COMPUTERS USED WITHIN THE UNITED STATES
(Yearend 1969 Figures Based on International Data Corp.'s Files)

SIC		U.S. Total (% by #)	U.S. Total (% by $)	RCA % Market Share	% of RCA Base (By Number)
48	Communication	1.9%	2.7%	11.2%	8.7%
91	Federal Government	7.5	10.5	6.3	19.2
36	Electrical Machinery	4.5	4.8	5.2	9.5
40-47	Transport. Carriers	2.7	3.3	5.0	5.6
92+93	State & Local Gov't.	4.6	4.1	4.8	9.1
49	Electric & Gas Svcs.	1.7	1.8	4.4	3.1
	RCA AVERAGE			2.4	
1X+2X	Non-Durable Mnfg.*	15.0	12.8	1.4	8.7
82	Education	6.3	6.5	0.9	2.3
35	Machinery	4.5	4.3	0.8	1.4
80	Hospital-Medical	1.8	1.2	0.7	0.5
50-59	Wholesale-Retail	7.8	5.3	0.7	2.2
20	Food (*exc. above)	3.0	2.0	0.6	0.7

Expanding for multinational operation

Despite RCA's hopes for domestic success, there's no question but that the true growth opportunities for the early 1970s lie beyond the boundaries of the United States (EDP/IR July 27,1970). And RCA, at present, is the only major U.S. computer manufacturer that has not established an international marketing or manufacturing operation. Rather, following RCA's historical pattern, the company decided during the early 1960s to license its computer products.

In the United Kingdom, English Electric bought the rights to the Spectra computers and produced its System 4. Now that this computer operation has been merged into International Computers Ltd., RCA can expect little from the future of this arrangement; ICL currently uses System 4 as an alternative for the customer who is using IBM System/360 equipment (since S/4 is compatible), but this source of license income will dry up as ICL develops its own family of computers.

And on the Continent, Siemens markets and manufacturers the Spectra Series. At first, the German electronics giant imported computer systems from RCA, changed the nameplate, and installed them. Gradually, Siemens has been making more and more of the systems it installs, giving RCA a decreasing portion of the income from these installations. Today, in fact, Siemens manufactures virtually all of the central processors it installs in its 4004 (based on Spectra) line; RCA still ships some of the peripherals that make up the total systems.

Looking to the future, there is talk -- which RCA will neither confirm nor deny, for obvious reasons -- that future systems could be the product of a joint venture between the two companies, with certain models being made in the U.S. and others being manufactured by Siemens. Already, the two companies have a marketing joint venture in South America. These arrangements, in a sense, are quite similar to that between IBM and its World Trade Corp. It wouldn't be inconceivable, therefore, to speculate that RCA might attempt to acquire Siemens' computer business.

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Current "challenges" facing RCA

The new management team at RCA, as would be expected, learned one lesson well while at IBM: Business orientation is the key to success, and right now marketing is the key to business success in the computer industry. As a reflection of this, the company has been bringing in new marketing personnel at an accelerated rate. At the present time, with over 1600 people in sales and systems support, RCA says that it is "close to having the second largest sales force in the U.S."

Many of the people RCA has been hiring are "young talent, right off the college campus, rather than professional hires." Also, RCA looks within the total corporation for systems people who have marketing capabilities. One of the top RCA executives points out that an IBM systems man is a good consultant, but he can't write code. These people from other parts of RCA, however, supposedly can do both.

RCA's problems, or "challenges," are quite clear from what has been pointed out above. And its top executives are the first to recognize them. Here is a summary of them as seen by RCA:

- RCA needs a broader product line;
- RCA needs strengths outside the United States;
- With the large influx of young people, there is a low level of maturity. RCA, thus, has the task of growing new, young managers.

The company claims it is on its way to meeting its goals and answering its challenges. It is heartened by the fact that it has weathered the economic slowdown and still hit its targets. Its management claims to be in control.

Whether it is . . . whether RCA can produce the 25% to 30% annual increase in shipments and the 20% or so increases in revenues that its plans call for . . . will be known only after the passage of time. The attitude and approach seem to be correct. Donegan sums up the current RCA philosophy quite succinctly:

> At IBM, you spend a lot of your time fine-tuning the machine within a few percent and even within tenths of a percent. One of the fun things about coming to a less mature organization is that you can make sweeping improvements and leave the fine tuning until later.

Computer industry observers -- EDP/IR included -- will be watching very carefully to see how a computer mainframe manufacturer works after it has had an IBM tuneup.

+ + + + + + + + + + + + + + +

TWO CONTINUING STORIES GET PENULTIMATE CHAPTERS

During the last week or so, two of the big, continuing stories in the computer industry have been given near-to-last chapters. The proposed merger of GE computer interests into Honeywell (EDP/IR May 29,1970) now nears fulfillment, and the IBM antitrust situation has come one step nearer settlement. Here's a rundown:

Honeywell recommends approval

In the cover letter accompanying a 52-page proxy statement delivered to stockholders last week, Honeywell Chairman James H. Binger called a special meeting and

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recommended that his stockholders vote "yes" to the proposal that would "combine under Honeywell's control, computer operations of General Electric Company and Honeywell."

The basic proposal follows along the lines announced originally, and a few more details are given out by the two companies. A few of the details in the proxy statement don't ring exactly right, but EDP/IR is well aware of the complex bookkeeping involved and of the many different ways of measuring a business in the computer industry. Here's what the proxy says the combination will include:

- more than 50,000 people;
- more than 10,000 installations of computer and related equipment for governments, educational institutions and other major classifications of commercial and industrial customers;
- more than $3.5 billion in original sales price of installed computer and related equipment in more than 35 countries, approximately $2.1 billion of which is on lease;
- 19 plant locations in seven countries; and
- revenues of $763 million in 1969, with an average growth rate over the past three years of approximately 20%.

Since some of these numbers are certainly different from those previously published in EDP/IR and elsewhere, and since at first glance they seem exceptionally high, we recommend that readers who are doing any careful analysis of the proxy statement recognize the following:

- The proxy statement discusses "installations of computer and related equipment." This definition would certainly include those sites outside the U.S. that use only Bull punched card equipment. Also, it is conceivable that a site with IBM computers and even one Keytape unit could be considered an "installation" with "related equipment." At yearend 1969, EDP/IR estimates there about 8500 Honeywell and GE computers at no more than 6000 sites.
- At yearend 1969, the total value of GE and Honeywell computer systems was $2.5 billion to $2.6 billion. The figure in the proxy represents the mid-year total, and included "related equipment."

IBM settles with Applied Data

In a joint statement, Applied Data Research, Inc. and Programmatics, Inc. and the International Business Machines Corp. said that "agreement had been reached . . . to dismiss the current anti-trust suits now pending against IBM and to release IBM from all claims by either company." The suit, dating back over a year, (EDP/IR Apr.24, 1969) involved software packages. ADR had asked for a judgement of $903,837,000.

The settlement calls for IBM to reimburse ADR "on behalf of both Applied Data Research and Programmatics . . . for costs incurred [totalling] $1.4 million. In addition," the release adds, "IBM and Applied Data Research are studying a business arrangement in which Applied Data Research would serve as a supplier for Autoflow to IBM. The arrangement when finalized will result in at least $600,000 of revenue to Applied Data Research over a period of three years." The suits had been consolidated in the Federal District Court in St. Paul with those of Control Data and DPF&G. These two, now, will have to go it alone, with only Justice on their side.

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August 3, - August 14, 1970

	1970 High	1970 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	21	494	27 3/8	24 1/8	24 5/8	- 2 1/4	- 8
American R & D	99 1/2	37 1/8	1806	44 1/4	39 1/2	42 1/4	+ 1 1/8	+ 3
Ampex Corp.	48 1/2	12 1/2	1691	15 3/4	12 1/2	13 5/8	- 1 3/4	-11
Bunker Ramo	14 1/2	6 1/8	713	7 5/8	6 3/4	6 3/4	- 3/4	-10
Burroughs	172 3/4	78 5/8	2605	95 3/4	86 1/8	88 3/4	- 7 1/4	- 8
Collins Radio	37 1/4	9	340	11 5/8	10 3/4	11	- 1/4	- 2
Computer Sciences	34 1/8	5 3/8	9690	7 1/4	5 3/8	6 1/2	- 5/8	- 9
Control Data	122 1/2	28 3/4	1859	34 1/4	31 7/8	32 1/4	+ 1/8	+
Data Proc. Fin. & Gen.	32	6 5/8	323	8 7/8	7 1/2	7 5/8	- 7/8	-10
Electronic Assoc.	11 5/8	3 5/8	171	4 5/8	3 3/4	3 3/4	- 1/2	-12
General Electric	78	60 1/4	2234	76 7/8	73 3/8	73 3/4	- 3 1/8	- 4
Honeywell	152	65 5/8	1458	87	77	79 3/8	+ 1 7/8	+ 2
IBM	387	218 3/4	5237	251 7/8	218 3/4	229 7/8	-22 3/8	- 9
ITT	60 1/8	30 1/2	4197	39 1/8	36 3/8	37 1/8	- 1 3/4	- 5
Leasco	30 1/2	7	893	9 3/8	8	8	- 1 1/4	-14
Litton	38	15 3/8	2185	17 5/8	15 5/8	16	- 1/2	- 3
Memorex	166 3/4	44 1/2	4824	53 1/4	44 1/2	49 3/4	+ 1 5/8	+ 3
Mohawk Data Sciences	87	18 1/8	1504	19 3/4	18 1/8	19 1/8	- 3/8	- 2
National Cash Register	63	30	5228	35 1/2	30	30 3/8	- 3 5/8	-11
Planning Research	53 1/4	13 5/8	552	16 1/2	14 3/4	14 7/8	- 1 1/8	- 7
RCA	34 5/8	18 1/8	4271	23 7/8	21 1/2	22 7/8	- 1/8	- 1
Raytheon	33 5/8	16 1/8	1086	18 1/2	16 5/8	17 3/4	- 1/4	- 1
SCM	24 3/4	11 1/8	463	13 1/4	12	12 3/8	- 5/8	- 5
Sanders	29 7/8	7 1/8	229	10 1/8	8 3/4	9 1/8	- 3/4	- 8
Sangamo	29 1/8	9 1/8	358	14 1/8	12 5/8	12 7/8	- 5/8	- 5
Singer	85 3/4	53 1/4	1068	60 1/4	57	57 1/2	-15	-21
Sperry Rand	40 3/8	18 3/4	6245	23 3/8	18 3/4	20 1/4	- 2 3/4	-12
Teledyne	40	13	1371	15 1/4	13 5/8	13 7/8	- 1 3/8	- 9
Telex	25 7/8	10	7606	12 7/8	10	10 3/4	- 1 1/2	-12
University Computing	99 3/8	13 1/4	7481	20 1/8	13 1/4	14 1/8	- 6	-30
Xerox	115 3/4	65 1/4	8403	70	65 1/4	67 1/8	- 5 3/4	- 8
NYSE COMPUTER STOCK AVERAGE							- 2.5	- 7.4
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	3 7/8	225	4 1/2	3 7/8	4	--	--
Automatic D P	47 3/4	23 1/2	1638	32	25 1/4	26 3/8	- 5 5/8	-18
Calcomp	33 7/8	10 1/4	1871	14 1/8	10 1/4	11 1/8	- 3 1/8	-22
Clary Corp.	10 1/2	3 3/8	75	4	3 5/8	3 5/8	- 1/4	- 6
Computer Applications	12 3/8	2	296	2 5/8	2	2 1/8	- 5/8	-23
Computing and Software	75 3/4	16 1/4	433	22 1/2	18 3/4	20 1/8	- 1 7/8	- 9
DPA, Inc.	10 3/8	3 3/8	5654	3 7/8	3 1/2	3 5/8	- 1/8	- 3
Data Products	25 1/2	4 3/4	1655	7 1/8	4 3/4	5 3/8	- 1 3/4	-25
Digital Equipment	124	48 3/4	121	58 1/2	52 3/4	55 5/8	+ 2 1/8	+ 4
Granite Mgt.	22 1/4	7 3/8	99	10 1/2	9	9 1/4	- 1	-10
Greyhound Computer	14 1/8	5	76	6 1/8	5	5 3/8	- 3/4	-12
ITEL	25 1/2	6 1/8	329	9 3/8	7 1/2	7 5/8	- 1	-12
Levin-Townsend Comp.	19 3/8	3	447	5	4 1/8	4 1/2	+ 1/4	+ 6
Milgo Elect.	40 1/2	15	1286	21 1/2	18 3/8	18 7/8	- 2 5/8	-12
Potter Instrument	42 3/4	14 5/8	294	17 3/8	15	16	- 1 1/4	- 7
Sys. Eng. Labs.	49 1/8	10 1/8	581	13 1/4	11	11 3/4	- 1 1/2	-11
AMSE COMPUTER STOCK AVERAGE							- 1.3	-10.0

	1970 High Bid	1970 Low Bid	August 14 Bid	August 14 Asked	2 weeks ago Bid	2 week net change Bid	2 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	8	1 1/4	1 1/4	1 5/8	1 1/2	- 1/4	-17
Bolt, Beranek & Newman, Inc.	11 1/4	5 1/2	6	6 3/4	6 1/4	- 1/4	- 4
Computer Usage	8 1/2	2	2 1/4	3	2 3/4	- 1/2	-18
DASA Corp.	44	3 3/4	4 5/8	5	5 1/8	- 1/2	-10
Digitronics	13 3/4	4 3/4	4 3/4	5 1/2	5 1/4	- 1/2	-10
Fabri-Tek	8 1/2	3 1/8	3 1/8	3 1/2	4	- 7/8	-22
Informatics, Inc.	20 1/2	4 1/4	5 1/4	5 3/4	4 1/2	+ 3/4	+17
LMC Data, Inc.	3 5/8	1 1/4	1 3/8	1 7/8	1 3/8	--	--
Management Assistance	4	1 1/4	1 3/8	1 5/8	1 1/2	- 1/8	- 8
Optical Scanning Corp.	52	11	11	12 1/2	17	- 6	-35
Recognition Equipment Inc.	83 1/2	12 1/2	13 1/4	13 3/4	15 1/4	- 2	-13
TBS Computer Centers Corp.	27	6	7	8 1/2	8	- 1	-13
Tally Corp.	23	10	11	12	12 1/4	- 1 1/4	-10

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" SEPTEMBER 9,1970 • VOL.5,NO.20 P.J.McGOVERN,EDITOR

Midyear review issue

AFTER A PAUSE IN COMPUTER EQUIPMENT SHIPMENT GROWTH, INDUSTRY PROSPECTS LOOK UP: SOME GROWTH IN 1970, 'NORMAL' 20% FOR 1971

Just about the time the clouds of doom had spread over skeptics both within and without the computer industry and had dampened the disposition of all but heartiest of souls, positive signs began to emerge. Today, only true pessimists can doubt that things look up.

What happened was that the economic downturn of 1969-1970 caught the computer industry at a particularly vulnerable time. As mainframe manufacturers readied themselves to announce new or cost-improved families of computers, their product marketing activity was impeded by mature product lines that reflected five or six year old technology. As a result, some industry observers began stating that -- contrary to popular notion -- the computer industry was not recession-proof.

Such views, of course, have some validity. No $10-billion industry can live through a period of significant economic pressure without feeling its effect. When the long-projected slowdown based on product life-cycle coincided with a period of reasonably severe economic pressure, the computer industry entered the first pause in its brief, 15-year history. It may turn out, however, that the industry was "last-in/first-out" and, as a result, was hurt less than most portions of the economy. Today, things already are looking up:

+ A midyear study by the International Data Corporation, publisher of EDP Industry Report, shows that about half the computer users in the United States are holding 1970 EDP budgets at 1969 levels; fewer than 10% have budget decreases; over 40% have increased expenditures.

+ The computer marketplace outside the U.S. -- which will receive almost 40% of the shipments by U.S.-based manufacturers this year -- is growing at a comfortable 25% rate in value of equipment in use.

+ Total new-built computer equipment shipments by U.S.-based manufacturers will be up almost 4% this year to $7.5 billion, following two years of shipments in the $7.2 billion range. As a result, revenues to these companies should be up 15% when 1970's results are tallied.

+ Announcement of System/370 has already upped IBM's backlog by an estimated $3 billion; RCA will announce new systems next week; talk is strong that NCR and Univac will introduce new systems soon. Thus, shipment increases during 1971 and 1972 should be back to the 15% to 20% level.

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Industry growth in a tight economy

The story for the mainframe manufacturers, of course, describes the largest single portion of the computer industry's prospects for this year. Its almost $8 billion in revenue -- up 15% from 1969 -- only sets the tone for the total industry. Overall, EDP/IR estimates that total user expenditures for computer equipment, software, supplies, and services from American-based companies will increase some 17% during 1970 to about $12.4 billion. Here's the way -- at midyear -- we see the major segments of the computer industry stacking up for 1970:

REVENUE TO U.S.-BASED PARTICIPANTS IN THE COMPUTER MARKETPLACE
(1969 and 1970 Estimates in $ Millions)

Industry Segment	1969 Revenue	1970 Revenue	Percent Change
General Purpose Computers	$6780	$7800	15%
Dedicated Application Computers	430	590	37
Independent Peripherals *	430	570	32
Data Processing Supplies	1075	1185	10
Leasing Companies *	$ 370	$ 465	26%
Contract and Packaged Software	450	560	25
Batch Service Bureaus	840	950	13
Remote Access Computing	90	125	39
Education	140	175	25
TOTAL	$10,605	$12,600	19%

* Indicates possible double counting

Each of the above industry sectors is growing -- faster or slower than the industry as a whole -- for a combination of reasons . . . some tied directly to the economy, some more a function of the nature and maturity of the particular segment within the entire computer industry. In the remainder of this issue, EDP/IR will discuss the factors that determine the 1970 results for the major mainframe manufacturers as well as the considerations most important in evaluating companies in the other segments of the marketplace.

Much of the analysis that follows is based both on our study of the participants themselves and on our continuing surveys of the users of computer products and services. Some of the industry segments covered here have been examined in more detail in earlier issues of EDP/IR; others will be covered during upcoming months. Some show dramatic increase; some are barely growing in relation to the industry. We would point out, however, that even during 1970 -- probably the "slowest" year ever in the history of the computer industry -- growth rates on average are higher than those of most other major industries even in their best years.

IBM SHIPMENTS TO STAY LEVEL; OTHER MANUFACTURERS SHOW 13% AVERAGE INCREASE

By the time most people started being down on the computer industry, things really were starting to look up. Shipments during 1969 showed no increase; this year they will be about 4% more. IBM's shipments dropped 5% during 1969; this year they will be about level. Total industry revenues during 1969 were up 16%; this year they will increase another 17%. By the time the growth pause was recognized, it seems, it essentially was over for major mainframe manufacturers. By now, most of this year's

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shipments have already been booked, and here's a rundown on how things looked as the second half of 1970 got underway.

IBM, as Board Chairman Thomas J. Watson, Jr. pointed out early this year, expected a "very difficult year" as it entered the 1970s. As usual, he carefully explained the situation to stockholders, but few of them listened. EDP/IR estimates that IBM's computer equipment shipments this year will be about equal to those in 1969 -- a far sight away from what is probably the projected plan, but at least better than the 5% decrease estimated to have been recorded last year. Moreover, revenue from the rental of computer equipment has returned to IBM's long-range growth "goal" of over 15% per year (this year it will exceed 18%). Finally, the reception given the System/370 seems to be considerably ahead of expectations.

About a month after System/370 was announced, EDP/IR sent out a mail questionnaire to several hundred present computer users who have equipment that rents for $20,000 a month or more and therefore who are potential customers for the S/370. Returns from over 250 users were received, and a detailed report on the results of this survey will be available in a few weeks. Our initial analysis indicates that IBM accomplished with this evolutionary computer system exactly what it wanted:

- Salesmen now have something exciting to push, and virtually every potential System/370 customer has been contacted by an IBM marketing person.

- IBM is not attempting to take business away from the competition; rather, for S/370 customers it is going after IBM users who either own their systems or who use a system provided by a third-party leasing company.

- User reception is good. Over 40% of the respondees have told IBM they will want delivery of a System/370 computer during 1971 or 1972, and an additional 15% or so are thinking about an S/370, but haven't indicated this to IBM. What's more, even users who aren't planning for one of the new computers at this time had nothing but favorable reactions to the products that were announced by IBM.

So even if IBM is expecting some difficulties during the remainder of this year, its future seems positive. The large 370s are receiving a favorable reaction, and several users -- as well as EDP/IR -- expect to see the announcement of the 370/145 and perhaps the 370/135 before this year is over.

So with this line of price/performance improved companions to the System/360, IBM should be in good shape until the mid-1970s. At that time it will be able to announce true fourth-generation computer components that will fit into a distributed computing system. Shortly prior to the announcement of this coming approach to mainframe equipment, we would expect to see IBM introduce its replacement for the keypunch/Hollerith card combination that today constitutes the predominant input method for computer users throughout the world.

The sudden upsurge and then the flattening of IBM's revenue growth during 1968-1969 was caused primarily by the third-party leasing companies. Because of aggressive purchasing by these new enterprises of IBM computers during 1967 and 1968, IBM had a surge of purchase revenue and is now getting back to its more normal business of producing equipment primarily for rental. IBM's strategy now seems to be designed to prevent such a situation from happening again. The industry giant has always planned on the basis of having control of its business, and obviously is irritated when an outside factor disrupts this control.

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During 1970, shipments of new-built equipment within the U.S. will probably be 15% less than for 1969. But IBM is doing well in the expanding international marketplace, and World Trade's 30% shipment increase should bring 1970's total shipments to about the 1969 level of $4.9 billion to $5 billion. At present, backlog is growing rapidly because of System/370 orders, and System/3 is moving well: By yearend, there should be more than 2000 of the small systems installed.

The new base provided by System/3 is very important to IBM's future. Even in bad times, EDP/IR surveys show, only a small percentage of computer users actually decrease their expenditures for computer equipment; most of them continue to hold steady or increase their spending.

HIS -- or Honeywell Information Systems, as the new computer company will be called if Honeywell stockholders approve the merger with General Electric's computer interests on Sept. 18 -- should be Number Two in shipments during 1970 with 9% or some $680 million for the year. Because of the GE portion, the new company's U.S. shipments will be even this year at best . . . with equipment shipments worth about $370 million both this year and last. The international portion of shipments will be up about 19%, however, so 1970 results should show an 8% to 10% shipment increase for the new company on a pro forma basis. The international portion will account for about 45% of total HIS computer shipments.

The new agglomeration, assuming it fuses, will constitute a strange new force in the computer industry. Futures for it are potentially good, but there are two midterm problems that must be solved. For one thing, the company will spend months if not a year sorting out the people it wants to keep, combining multinational operations in the most efficient manner, and building an esprit de corps among prior competitors . . . at a time when there is no announced new product line around which to rally the troops.

So a new product line, obviously, will be another prime order of business for the Honeywell executives who assume control of HIS. Each of the companies has been working in this direction, naturally. Now, however, the challenge may be somewhat more complex, since additional existing product lines must be considered. It would seem reasonable that the product designers would follow a line that apparently was being followed by Honeywell: Build an IBM-compatible system that could also be made compatible with existing products without too much trouble. One solution would be what has been called variable micrologic (EDP/IR May 18,1970) or programmable read-only memory (EDP/IR Apr.4,1969). This technique is inherent in IBM's System/370, and potentially could provide computer users a painless method of transition from one computer model to another . . . giving him true machine transparency.

Univac has introduced nothing really new -- except perhaps the 1106 -- in quite a few years. The 9000 series, circa 1967, opened up some new business opportunities in the small computer market, but even here the company lost many 1004 users to other manufacturers. At the large-scale end, talk is that the 1110 will be announced soon.

As the first company into the computer industry, Univac has long been known for its technological excellence but also for its lack of adequate marketing follow-through. Several years ago, this situation earned the company a tongue-in-cheek description: "Never in the course of industrial history has one company so often snatched defeat from the jaws of victory." Univac has been trying to dispell the implications in this statement for the last several years, but so far it has not been overly successful.

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During 1970, EDP/IR estimates, Univac will be one of the two major mainframe manufacturers that will ship a smaller value of new-built systems than it did last year. Within the U.S., it will have an understandable shipment decrease of about 10%; in the international marketplace, however, it will not have the compensating growth most other manufacturers will achieve. Indeed, Univac's shipment level for 1970 will be about $400 million, about 4% below the record it chalked up in 1969.

Burroughs, just as it did last year, looks to be headed for the second largest percentage shipment increase by a major manufacturer. Its U.S. shipment increase of 35% is most healthy; its increase by 45% in the international portion of the marketplace stands to reason. General-purpose computer equipment shipments during 1970 of $485 million should put Burroughs into the solid Number Three position, behind the combined Honeywell-GE results and, of course, IBM. And the company's backlog, as measured early this year, was second in the industry.

Figures for Burroughs -- as for all the major mainframe manufacturers -- include only new-built equipment shipped for installation as a part of a general-purpose computer system. Thus, OEM shipments and installations of accounting machines or TC-500s that do not operate on line with a computer are not included. It is interesting to notice that Burroughs -- as well as NCR -- entered the computer industry through "traditional" bookkeeping equipment and these companies seem to be faring best in the mixed economic situation of the last six-to-twelve months. The company is expanding rapidly, and still is making hay from a computer designed during the early 1960s. One reason for this, of course, is that it adapted the approach of designing software functions into hardware.

NCR says it "means computers," and its results during the last year or so seem to be helping prove that, like Burroughs, an old-line accounting machine company can "make it" in the computer industry. This year, just as in 1969 (EDP/IR Mar.12,1970), NCR shows the most growth in shipments of any major computer manufacturer. Its growth rate in shipments is "only" 55% or so throughout the world, down from 90% during 1969. But with another $300-million-plus in computer shipments this year, the company is more than holding its own among the major manufacturers.

This phenomenal growth for NCR, interestingly, has come from the small computer user, since the only two machines being actively marketed today by NCR are its Century 100 and 200, the larger of which can run to maybe $9,000 monthly rental, less than the average IBM 360/30. An upgrade model -- either/or the 300 or 400 -- may be announced during the fall, but NCR still is proof that there is a market for small computer systems.

An examination of Century customers shows that NCR delivers about one-third of its equipment to new users, one-third to present NCR customers who are either moving from accounting equipment to a computer or who are being upgraded from a small 315 or 390 series computer, and one-third to customers who previously have used equipment manufactured by a competitive company.

RCA will "show a new series" of computers on Sept. 15, and says it should be considered a "sleeping giant," especially in the U.S. marketplace. Shortly after IBM announced System/360, RCA introduced its Spectra 70 series -- a fully compatible family of computers with apparently better price/performance than the 360 counterparts. During the late 1960s, the prime marketing thrust for the Spectra line was as a second source to large IBM 360 users, as a lower-priced supplier to state and local governments, and a prime supplier to many Bell Telephone companies.

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For the present, RCA continues to exert its strengths in these areas while it attempts a better saturation of other application areas -- such as education and medicine -- that it thinks will grow more rapidly than the overall market in the near future. It is also concentrating heavily on communications applications.

In two ways, RCA is unique among U.S. computer companies: It is the only major manufacturer that to date has not directly expanded into the international marketplace, relying as it does on license agreements with Siemens in Europe and Hitachi in Japan; second, it was the first manufacturer to pull off a major high-level raid on IBM management, and has set the goal of being Number Two domestically by 1975. RCA operates from a strong financial base, so it is especially worth watching in the light of its unusual characteristics. In the course of achieving its established goals, RCA's computer operation plans to move its revenue contribution from a current 9% of the corporation's revenues to about 15% by 1975.

CDC -- master builder of supercomputers -- saw new-built computer system shipments drop over 4% in 1969, and prospects are for an even larger shipment decrease this year. EDP/IR estimates that the company's worldwide shipments will be off some 10% this year (even in the face of a 20% increase in shipments outside the U.S.). Thus, it will have the smallest amount of shipments of any of the major manufacturers. The company's near-term outlook would seem rather bleak unless or until Federal spending in ecology control areas creates a need for large amounts of computation.

A couple of years ago, when it merged with Commercial Credit, CDC seemed to be taking the correct tack . . . assuring itself of a "bank," as it were. Since then, however, there have been some problems. During the first half of 1970, the company has shut down some plants, had some layoffs -- primarily of production people -- throughout the U.S., and instituted "voluntary" salary reductions averaging 10% for the balance of 1970.

Earlier this year, CDC introduced some smaller models of its 7600 computer, but it is too early to measure the success of this equipment. Also, it is hard at work preparing to deliver an advanced computer called Star to one government customer in 1971, and is having discussions with several commercial organizations about the same machine. It is a large, STring ARray processor that some CDCers feel could have commercial applications for large corporations.

XDS SHIPMENTS OFF; DEC AND MINIMANUFACTURERS TO POST NEW RECORDS

The two "in between" computer manufacturers -- Digital Equipment Corp. and Xerox Data Systems -- have a somewhat similar split of product line between general-purpose and dedicated application computers. But the similarity stops there. XDS looks as if it will be off about 20% in computer system shipments both in the U.S. and abroad. DEC, on the other hand, just posted its fiscal 1970 (ending June 27) results, and sales are up 48%. And EDP/IR estimates that DEC's 1970 shipments of new-built computer equipment will be up 49% to $131 million.

Approximately 65% to 70% ($85 million to $90 million) of Digital's 1970 shipments will be minicomputers. This upward shift reflects two important factors in the computer industry outlook for this year. First, there is a certain amount of softness in the general-purpose marketplace (and DEC is shipping fewer PDP-10s); second, the market for minicomputers is still going strong.

This second point shows up clearly in EDP/IR's projection for dedicated application computer equipment shipments to increase 37% this year to $590 million.

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Some of this equipment is in the form of expensive process control equipment probably ordered more than a year ago as part of capital expansion plans that have not been slowed. Much of it, however, is for minicomputers.

The market for these small general-purpose computers that sell for less than $25,000 and usually are operated for a specific application is still going well. Much of the equipment is being shipped by companies that weren't even in the computer business two or three years ago. These companies -- such as Hewlett-Packard and Varian -- tend to be application oriented and sell solutions, not computers.

SPENDING FOR SUPPLIES UP 10%; INDEPENDENT PERIPHERAL AND LEASING REVENUES HEALTHY

Sandwiched in between computer systems and true computer services in the marketplace breakdown shown on page 2 are three categories that have unusual characteristics. One of them -- supplies -- represents the second largest segment of the computer industry, yet probably is the least exciting to most observers. The other two -- third-party leasing and independent peripherals -- are much more exciting. They are unusual, however, in that whether revenues are counted from the viewpoint of the industry participant . . . or whether spending is tallied from the user's point of view . . . these two segments produce some double counting. Here's a rundown on the outlook for these segments that will account for 14% or about $1.7 billion in industry revenue during 1970:

Data processing supplies -- punched cards, paper, ribbons, magnetic tape, disk packs, and other "consumables" -- will grow about 10% this year as they account for 9.5% of computer industry revenues. This relatively stable portion of the industry seems to be settling down after a spurt during the last 1960s when disk packs first became a significant factor. Although disk packs and magnetic tape get the lion's share of the attention given the products counted in this category, paper forms and cards account for over 75% of the business.

Third-party leasing companies -- the darlings of the late 1960s -- were developed around the assumption that third-generation computers would have a market life of eight to ten years. By the gradual depreciation this assumption created, these firms were able to offer users what appeared to be "ten dollar bills for nine dollars." Spawned by the influx of IBM/360s that were coming on the market, these companies had their heyday during the late 1960s . . . buying up and leasing over $1 billion worth of 360s during 1968 alone, very close to a total of $2 billion during the last three years of the 1960s.

These prior purchases are resulting in increased income now, and revenues to these companies -- paid by users in lieu of rentals to IBM -- will be up this year 26% to over $450 million. But new purchases will be off significantly. Indeed, new purchases this year will barely exceed $200 million -- most of that for additional memory or new peripherals for existing customers -- and the general outlook seems to be one of holding steady, taking care of current customers, and looking outside computer leasing for additional business.

And System/370 doesn't look to be the beginning of a new era for the third-party leasing companies. For one thing, few current users seem to desire this financial approach when and if they accept delivery of IBM's new equipment. For another, today's tight money would probably prevent extensive new purchases even if they were desired. Very few established third-party leasing companies indicate they will buy System/370 equipment for their portfolios. Indeed, many of them see customers reverting to 90-day cancellation clauses once their original one- two-

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or three-year leases expire, and the resulting challenge to leasing companies is clear-cut: Keep equipment in use at the highest possible rental rate for the longest possible time.

This strategy, of course, seems to be exactly what IBM would wish. The computer industry giant was burned -- thrown off its planned objectives -- when it had to accept excessive purchases . . . and excessive short-term profits to the detriment of long-term revenues . . . during the last few years when too many computers were sold.

Independent peripheral equipment manufacturers have probably fared better during the economic downturn than any other single segment of the computer industry. Manufacturers of plug-to-plug compatible memory equipment (EDP/IR Aug.17,1970) are a case in point. This group of suppliers -- Telex with tape drives; Memorex with disk drives; MAI, the third-party leasing company that specializes in this area; and all the others -- have been able to use tightened budgets to their advantage.

Surveys conducted during the first half of this year by EDP/IR and by IDC, its publisher, indicate that many users -- confronted with growing equipment requirements but stable budgets -- have gone the route of the independent peripheral supplier. Equipment costs normally are 15% to 20% less than those offered by IBM or other mainframe manufacturers, and in most cases performance and service are equal if not better.

The independents, it would seem, thrive best toward the end of a product cycle -- since, to sell, their products must be compatible, and thus can't be introduced until several months to a year or so has passed since the IBM original was released. Also, tight user budgets make the cost savings offered by the independents attractive. During the last year or so both these situations have been prevalent in the marketplace, so it's no wonder that the independent peripheral manufacturers will show a 32% revenue increase for 1970 to the $570 million level. The percentage increase should drop slightly next year as new IBM equipment enters the marketplace, but growing sophistication on the part of computer users almost guarantees a good future for companies in this segment of the marketplace.

BATCH SERVICE BUREAUS HAVE MODERATE GROWTH AS OTHER SERVICES PROSPER

The service-related portion of the computer-related marketplace is expected to grow this year by 18%, just about the same rate as the entire industry, to almost $1.8 billion in revenue. There are, however, dramatic differences among the four segments that constitute this portion of the market. Batch-processing service bureaus -- the third largest single market sector -- will have reduced growth; more esoteric areas -- software, remote processing, and education -- will grow at rates above that for the total industry. Growth for the first and third of the latter areas, of course, is due to IBM's introduction of separate pricing over a year ago (EDP/IR July 14, 1969).

Service bureaus specializing in batch processing, it would seem on the surface, would benefit by a curtailment in user spending for new equipment. As case could easily be made for the fact that when computer users can't add equipment to fulfill their data processing needs they will take care of overflow requirements by farming out work to a service bureau. This has not been the case.

Rather, user simply haven't been going ahead with new applications when they couldn't install the required equipment. Also, the enforced budget tightening that has come with budget pinches has forced management to take a second look at data

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processing costs . . . and data processing managers to finally prove their salt and run their shops more efficiently. Thus, a service bureau increase in revenue for 1970 of 13% to $950 million could seem very healthy.

Remote access processing -- long in the limelight through time sharing (EDP/IR Aug.29,1968) -- looks at least as rosy as any area of the computer industry. During 1970, this market is expected to increase over 35% to about the $125 million level. Forecasts for this market sector -- ours included -- have been more optimistic in the past, but it seems certain that an initial marketplace consolidation has occurred and that the future for this market is indeed bright.

In the remote processing area, General Electric is still the unquestioned leader, and this is the one portion of the computer business that is not included in the pending merger of Honeywell and the GE computer interests. In a sense, it is GE's way of saying: "We're out of the turbo-generator business, but we're still going to make and market transformers . . . and possibly appliances."

As 1970 began, there were -- count them -- 170 different suppliers of time-sharing service within the United States. Quite a few of these have either folded or consolidated during the "stock-taking" of 1970, and the industry has every prospect of being more healthy by the end of this year than it ever has been.

Education is a segment of the computer industry that was essentially overlooked until IBM decided to unbundle a year ago. This year -- largely because of IBM's entry -- this segment looks to have a 25% growth in revenue to $175 million, and prospects are that this growth rate will grow. If so, the education sector will be the only computer industry segment that will increase its rate of growth substantially during the next few years. Other mainframe manufacturers -- specifically Honeywell and Control Data -- have established "institutes," but there is still an opportunity for independents that do a conscientious job.

Contract and packaged software revenues will be up about 25% this year because of IBM's entry . . . even though IBM's estimated income of $100 million will be far lower than original expectations. Users will probably increase their spending with independent suppliers by 18% to 20%, contributing around $380 million to this sector, but mainframe manufacturers -- many of whom are pinched for cash -- will probably cut their spending for special software to the $80 million level.

Prognosis

There has definitely been a pause in the increase of user spending for computers in the United States. It started toward the end of 1969, and has continued into the first half of 1970. But the pause apparently is ending. User spending in 1970 will be up 12% to 14%, and an increase of 16% to 18% above 1970 levels is projected for 1971.

Economic conditions have had an effect on the computer industry, to be sure. But the state of the product cycle is just as much -- if not more -- a contributing factor. It really seems to EDP/IR that IBM actually proved this a couple of months ago when it introduced System/370. User reaction has been good . . . announcements are about to come from other manufacturers . . . and the computer industry truly has survived its first troubled period and come out smelling like growth -- just as it always has. EDP/IR thinks it will be at least the end of the 1970s -- if ever -- before the computer even begins to slow down to a growth rate that approaches GNP or the like. By then, of course, the industry will be so large that it will be hard to define . . . much less to measure.

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GENERAL PURPOSE COMPUTER CENSUS

Counts in the General Purpose Digital Computer (Group A) Census, shown below, are based on the best information available to the International Data Corporation, but are estimates. Computer manufacturers, as a rule, do not directly supply this type of information, and it is only through the use of IDC's extensive data files and other information sources that such estimates are possible. The computers included in "Group A" comprise the bulk of digital computers in operation. They are byte or character oriented -- with the exception of large-scale scientific machines -- and are primarily programmed with higher-level languages. In addition to this Census, EDP/IR publishes a Dedicated Application Digital Computer (Group B) Census that includes minicomputers and specialized-purpose machines.

AS OF JULY 1, 1970

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Burroughs	205	$ 4,600	1/54	3	13	16	X
	220	$ 14,000	10/58	12	2	14	X
	B-100 Series	$ 3,300	8/64	55	6	61	X
	B-200 Series	$ 6,500	11/61	298	135	433	X
	B-300 Series	$ 8,000	7/65	564	88	652	X
	B-500	$ 3,800	11/68	213	204	417	90
	B-2500	$ 6,200	2/67	154	60	214	70
	B-3500	$ 14,000	5/67	244	107	351	110
	B-4500	$ 29,000	11/71	-	-	-	15
	B-5500	$ 37,500	3/63	129	37	166	5
	B-6500	$ 70,000	6/69	13	6	19	41
	B-8500	$200,000	4/69	2	0	2	0
	Subtotals			1687	658	2345	331
Computer Operations, Inc.	Gemini	$225,000	6/71	-	-	-	1
Control Data Corp.	G-20	$ 19,600	4/61	13	9	22	X
	1604/A	$ 42,000	1/60	33	9	42	X
	31/3150	$ 10,500	12/64	97	50	147	11
	3170	$ 16,700	12/70	-	-	-	NA
	3200	$ 14,000	5/64	61	36	97	X
	3300	$ 20,500	9/65	120	87	207	28
	3400	$ 23,700	11/64	9	10	19	X
	3500	$ 25,000	1/69	8	8	16	3
	3600	$ 48,000	6/63	28	16	44	X
	3800	$ 53,000	12/65	17	4	21	X
	6200	$ 39,000	11/70	-	-	-	3
	6400	$ 55,300	5/66	62	17	79	9
	6500	$ 65,500	12/67	14	2	16	3
	6600	$127,000	8/64	64	20	84	8
	6700	$137,000	7/70	-	-	-	2
	7600	$190,000	1/69	3	0	3	5
	Subtotals			529	268	797	72
Digital Equipment Corp.	PDP-6	$ 10,000	10/64	18	3	21	X
	PDP-10	$ 13,500	10/67	125	30	155	20
	Subtotals			143	33	176	20
Friden	System 10	$ 1,400	9/70	-	-	-	30
General Electric	53	$ 960	3/69	-	50	50	50
	55	$ 990	1/66	70	1170	1240	130
	58	$ 980	5/70	20	90	110	100
	105	$ 1,350	3/69	45	140	185	80
	115	$ 2,500	4/66	500	1040	1540	90
	120	$ 3,200	1/70	9	32	41	60
	130	$ 4,400	10/69	3	60	63	40
	205	$ 2,900	6/64	8	0	8	X
	210	$ 16,000	3/60	32	0	32	X
	215	$ 6,000	9/63	9	2	11	X
	225/255	$ 8,000-$17,000	4/61-10/67	160	23	183	X
	235/265	$12,000-$19,500	4/64-10/65	96	17	113	X
	245/275	$13,000-$23,000	10/69-10/69	8	2	10	5
	405/410	$ 6,800-$10,500	2/68-11/69	32	6	38	6
	415/420	$ 7,300-$18,000	5/64- 6/67	257	180	437	X
	425/430	$ 9,600-$16,700	6/64- 6/69	78	55	133	X
	435/440	$13,700-$23,800	9/65- 7/69	34	8	42	6
	615	$ 30,000	6/69	12	2	14	10
	625	$ 36,000	4/65	2	7	9	X
	635	$ 45,000	5/65	69	7	76	6
	645	$ 90,000	7/66	4	0	4	X
	655	$ 80,000	12/70	-	-	-	8
	Subtotals			1448	2891	4339	591
Honeywell, EDP Division	Series-15	$ 1,800	7/70	-	-	-	15
	110	$ 2,600	9/68	175	53	228	40
	115	$ 3,700	6/70	4	0	4	200
	120	$ 4,800	1/66	780	265	1045	35
	125	$ 7,100	12/67	139	185	324	50
	200	$ 7,500	3/64	750	300	1050	X
	1200	$ 9,800	2/66	165	83	248	X
	1250	$ 12,000	8/68	183	32	215	40
	2200	$ 18,700	1/66	150	63	213	30
	3200	$ 22,000	2/70	9	2	11	23
	4200	$ 26,200	9/68	19	2	21	9
	8200	$ 50,000	2/69	9	4	13	6
	400	$ 10,600	12/61	51	37	88	X
	1400	$ 14,000	1/64	4	6	10	X
	800	$ 26,000	12/60	59	14	73	X
	1800	$ 46,000	1/64	14	3	17	X
	Subtotals			2511	1049	3560	448

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AS OF JULY 1, 1970

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IBM	System-3	$ 1,400	1/70	650	20	670	7500
	360/20	$ 3,200	12/65	7750	3710	11,460	1860
	360/25	$ 7,500	10/68	1600	500	2100	750
	360/30	$ 10,500	6/65	7650	3300	10,950	450
	360/40	$ 19,300	5/65	3320	1580	4900	580
	360/44	$ 12,000	7/66	157	71	228	25
	360/50	$ 33,000	8/65	1370	555	1925	240
	360/65	$ 63,000	11/65	622	180	802	135
	360/67	$138,000	6/66	46	8	54	11
	360/75	$ 81,400	1/66	56	20	76	7
	360/85	$155,000	10/69	6	3	9	10
	360/9X	$150,000	11/67	16	6	22	X
	360/195	$232,000	3/71	-	-	-	12
	370/155	$ 48,000	2/71	-	-	-	NA
	370/165	$ 90,000	4/71	-	-	-	NA
	1130	$ 1,700	2/66	3770	1340	5110	400
	305	$ 3,600	12/57	3	10	13	X
	650	$ 4,800	12/54	22	14	36	X
	1401	$ 6,200	9/60	1940	1660	3600	X
	1401-G	$ 2,300	5/64	370	100	470	X
	1401-H	$ 1,300	6/67	150	40	190	X
	1410	$ 17,000	11/61	200	105	305	X
	1440	$ 4,100	4/63	1025	730	1755	X
	1460	$ 9,800	10/63	156	68	224	X
	1620	$ 4,000	9/60	650	362	1012	X
	7010	$ 26,000	10/63	43	12	55	X
	7030	$160,000	5/61	6	2	8	X
	704	$ 32,000	12/55	8	2	10	X
	7040	$ 25,000	6/63	36	37	73	X
	7044	$ 36,500	6/63	27	22	49	X
	705	$ 38,000	1/56	20	10	30	X
	7070/74	$ 27,000	3/60	193	64	257	X
	7080	$ 60,000	8/61	76	2	78	X
	709	$ 40,000	8/58	1	0	1	X
	7090	$ 63,500	6/60	31	23	54	X
	7094	$ 73,400	9/62	88	9	97	X
	7094-II	$ 79,400	4/64	21	1	22	X
	Subtotals			32,079	14,566	46,645	11,980
NCR	Century-100	$ 2,600	9/68	845	200	1045	810
	Century-200	$ 7,700	6/69	270	65	335	420
	304	$ 14,000	1/60	18	3	21	X
	310	$ 2,500	5/61	17	4	21	X
	315	$ 9,000	5/62	455	390	845	X
	315-RMC	$ 12,500	9/65	100	33	133	X
	390	$ 1,000	5/61	345	410	755	X
	500	$ 1,200	10/65	1540	1000	2540	50
	Subtotals			3590	2105	5695	1280
Philco	1000	$ 7,000	6/63	13	1	14	X
	210/211	$ 40,000	10/58	12	1	13	X
	212	$ 52,000	1/63	12	1	13	X
	Subtotals			37	3	40	
RCA	Spectra 70/15	$ 4,500	9/65	65	120	185	34
	Spectra 70/25	$ 7,200	9/65	25	52	77	15
	Spectra 70/35	$ 11,000	1/67	195	194	389	53
	Spectra 70/45	$ 21,000	11/65	347	162	509	83
	Spectra 70/46	$ 36,000	11/68	44	1	45	15
	Spectra 70/55	$ 35,000	11/66	29	13	42	12
	Spectra 70/60	$ 38,000	9/70	-	-	-	8
	Spectra 70/61	$ 50,000	2/71	-	-	-	5
	301	$ 7,500	2/61	315	215	530	X
	3301	$ 19,000	7/64	80	8	88	X
	501	$ 14,000	6/59	53	2	55	X
	601	$ 35,000	11/62	5	0	5	X
	Subtotals			1158	767	1925	225
Standard Computer Corp.	IC-4000	$ 9,000	9/68	13	0	13	3
	IC-6000	$ 16,000	5/67	9	0	9	X
	IC-7000	$ 17,000	6/69	14	0	14	5
	Subtotals			36	0	36	8
Univac	I/II	$ 25,000	3/51-11/57	17	3	20	X
	III	$ 25,400	8/62	53	37	90	X
	File Computers	$ 15,000	8/56	2	0	2	X
	SS-80/90	$ 8,000	8/58	95	60	155	X
	418-I/II	$ 13,700	6/63	103	74	177	X
	418-III	$ 19,600	7/69	16	9	25	16
	491/492	$ 27,000	12/61	44	24	68	X
	494	$ 41,400	2/66	45	20	65	11
	1004	$ 1,900	2/63	1325	1275	2600	X
	1005	$ 2,550	4/66	710	195	905	X
	1050	$ 8,800	9/63	250	162	412	X
	1103/1105	$ 35,000	12/50- 9/58	6	2	8	X
	1106	$ 40,000	12/69	6	1	7	13
	1107	$ 57,000	10/62	22	19	41	X
	1108	$ 68,000	9/65	119	72	191	26
	9200	$ 1,700	6/67	1210	560	1770	280
	9300	$ 4,000	9/67	580	555	1135	180
	9400	$ 10,000	5/69	68	32	100	100
	Larc	$135,000	5/60	1	0	1	X
	Subtotals			4672	3100	7772	626
XDS	Sigma-5	$ 7,700	8/67	138	34	172	20
	Sigma-6	$ 14,100	11/70	-	-	-	8
	Sigma-7	$ 16,600	12/66	86	24	110	10
	940	$ 25,000	4/66	70	9	79	X
	9300	$ 8,500	11/64	33	8	41	X
	Subtotals			327	75	402	38
	TOTALS			48,217	25,515	73,732	15,650

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August 17, - August 28, 1970

	1970 High	1970 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	21	983	32 1/2	24 1/2	32 3/8	+ 7 3/4	+31
American R & D	99 1/2	37 1/8	4192	58	41 3/4	56 3/8	+14 1/8	+33
Ampex Corp.	48 1/2	12 1/2	3107	17 1/4	13 1/2	16 1/2	+ 2 7/8	+21
Bunker Ramo	14 1/2	6 1/8	1178	8 1/8	6 3/4	8	+ 1 1/4	+19
Burroughs	172 3/4	78 5/8	5644	110 1/2	88 3/8	109 1/2	+20 3/4	+23
Collins Radio	37 1/4	9	1159	14 1/8	10 3/4	12 7/8	+ 1 7/8	+17
Computer Sciences	34 1/8	5 3/8	3855	8 3/8	6 3/8	7 7/8	+ 1 3/8	+21
Control Data	122 1/2	28 3/4	3022	37 7/8	31 3/4	36	+ 3 3/4	+12
Data Proc. Fin. & Gen.	32	6 5/8	1532	12	7 5/8	12	+ 4 3/8	+57
Electronic Assoc.	11 5/8	3 5/8	445	5 3/4	3 5/8	5	+ 1 1/4	+33
General Electric	80	60 1/4	4325	80	73 1/2	79	+ 5 1/4	+ 7
Honeywell	152	65 5/8	3032	94 1/2	79	88	+ 8 5/8	+11
IBM	387	218 3/4	5589	271 1/2	227 1/2	271 1/4	+41 3/8	+18
ITT	60 1/8	30 1/2	6495	41 3/4	36 7/8	41	+ 3 7/8	+10
Leasco	30 1/2	7	4901	10 3/4	8	10 1/4	+ 2 1/4	+28
Litton	38	15 1/4	8350	19 5/8	15 1/4	19 1/2	+ 3 1/2	+22
Memorex	166 3/4	44 1/2	7663	70 1/2	48 1/4	70 1/8	+20 3/8	+41
Mohawk Data Sciences	87	18 1/8	2848	28 1/2	19	27	+ 7 7/8	+41
National Cash Register	63	29 1/4	6172	40 1/2	29 1/4	39 5/8	+ 9 1/4	+30
Planning Research	53 1/4	13 5/8	807	20 1/2	14 1/2	20 3/8	+ 5 1/2	+37
RCA	34 5/8	18 1/8	3856	24 5/8	22 1/4	24 1/2	+ 1 5/8	+ 7
Raytheon	33 5/8	16 1/8	1024	19 7/8	17 1/8	19 1/8	+ 1 3/8	+ 8
SCM	24 3/4	11 1/8	1339	14	12	13 7/8	+ 1 1/2	+12
Sanders	29 7/8	7 1/8	915	11 3/4	9	11 1/2	+ 2 3/8	+26
Sangamo	29 1/8	9 1/8	340	14 1/2	12 3/4	13 3/4	+ 7/8	+ 7
Singer	85 3/4	53 1/4	724	66 1/4	56 1/4	66 1/4	+ 8 3/4	+15
Sperry Rand	40 3/8	18 3/4	5912	23 3/4	20 1/4	23 3/4	+ 3 1/2	+17
Teledyne	40	13	5527	18 7/8	13 3/4	18 1/2	+ 4 5/8	+33
Telex	25 7/8	9 1/8	11,093	12 3/8	9 1/8	12	+ 1 1/4	+12
University Computing	99 3/8	13 1/4	5294	18 3/8	14 1/4	18 3/8	+ 4 1/4	+30
Xerox	115 3/4	65 1/4	8496	80 1/2	67	79 1/2	+12 3/8	+18
NYSE COMPUTER STOCK AVERAGE							+ 6.8	+22.5
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	3 3/4	774	6 7/8	3 3/4	5 1/2	+ 1 1/2	+38
Automatic D P	47 3/4	23 1/2	2303	35 7/8	26	35 7/8	+ 9 1/2	+36
Calcomp	33 7/8	10 1/4	2371	14 7/8	10 5/8	14 1/4	+ 3 1/8	+28
Clary Corp.	10 1/2	3 3/8	204	5 1/2	3 5/8	5 1/2	+ 1 7/8	+52
Computer Applications	12 3/8	2	421	2 3/4	2	2 5/8	+ 1/2	+24
Computing and Software	75 3/4	16 1/4	1041	25 1/2	18 5/8	22 3/8	+ 2 1/4	+11
DPA, Inc.	10 3/8	3 3/8	312	4 3/4	3 3/8	4 1/4	+ 5/8	+17
Data Products	25 1/2	4 3/4	2155	7 7/8	5	7 7/8	+ 2 1/2	+47
Digital Equipment	124	48 3/4	4614	75 1/2	55 3/8	71	+15 3/8	+28
Granite Mgt.	22 1/4	7 3/8	230	11 1/4	8 1/4	11 1/4	+ 2	+22
Greyhound Computer	14 1/8	5	108	7 1/2	5 1/8	7 1/2	+ 2 1/8	+40
ITEL	25 1/2	6 1/8	725	10 5/8	7 1/2	10 1/8	+ 2 1/2	+33
Levin-Townsend Comp.	19 3/8	3	578	5 7/8	4 1/2	5 3/8	+ 7/8	+19
Milgo Elect.	40 1/2	15	4100	25 3/4	18 5/8	25	+ 6 1/8	+32
Potter Instrument	42 3/4	14 5/8	1113	22 1/2	15 1/2	22	+ 6	+38
Sys. Eng. Labs.	49 1/8	10 1/8	3754	14 7/8	10 7/8	14 3/8	+ 2 5/8	+22
AMSE COMPUTER STOCK AVERAGE							+ 3.7	+30.4

	1970 High Bid	1970 Low Bid	August 28, Bid	August 28, Asked	2 weeks ago Bid	2 week net change Bid	2 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	8	1 1/4	1 1/4	1 5/8	1 1/4	--	--
Bolt, Beranek & Newman, Inc.	11 1/4	5 1/2	6 3/8	6 7/8	6	+ 3/8	+ 6
Computer Usage	8 1/2	2	2 1/2	3	2 1/4	+ 1/4	+11
DASA Corp.	44	3 3/4	5 1/8	5 1/2	4 5/8	+ 1/2	+11
Digitronics	13 3/4	4 1/4	4 1/2	5 1/4	4 3/4	- 1/4	- 5
Fabri-Tek	8 1/2	2 7/8	3 1/4	3 5/8	3 1/8	+ 1/8	+ 4
Informatics, Inc.	20 1/2	4 1/4	6 3/8	6 7/8	5 1/4	+ 1 1/8	+21
LMC Data, Inc.	3 5/8	1 1/4	1 3/8	1 3/4	1 3/8	--	--
Management Assistance	4	1 1/4	1 5/8	1 7/8	1 3/8	+ 1/4	+18
Optical Scanning Corp.	52	11	19 1/2	21	11	+ 8 1/2	+77
Recognition Equipment Inc.	83 1/2	12 1/2	18	18 1/2	13 1/4	+ 4 3/4	+36
TBS Computer Centers Corp.	27	6	6 1/2	8	7	- 1/2	- 7
Tally Corp.	23	9 1/2	11 3/4	12 3/4	11	+ 3/4	+ 7

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" OCTOBER 20,1970 • VOL.5,NO.21 P.J.McGOVERN,EDITOR

RISING ACCEPTANCE OF IBM SYSTEM/3 BRINGS THOUSANDS OF NEW ORGANIZATIONS INTO THE COMPUTER USING COMMUNITY

The figures from the last EDP/IR Computer Census indicate the potential of IBM's small, new computer:

NAME OF MANUFACTURER	COMPUTER MODEL	AVERAGE MONTHLY RENTAL	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
IBM	System-3	$ 1,400	1/70	650	20	670	7500

And orders for the System/3, announced just over a year ago, are running quite well despite the slow economy (EDP/IR Aug.6,1969). Of the 7500 orders indicated above, about 5300 are for delivery within the U.S. -- half to existing tab equipment users, the other half to service bureau customers or people with their own computer.

Communications capability for System/3 was announced earlier this year (EDP/IR Mar.4,1970) and ultimately will bring some hefty orders to IBM from large customers. So far, however, communications hasn't had a major effect on IBM's backlog. For this issue of the newsletter, we have analyzed several hundred System/3 orders and interviewed 23 data processing managers. The following highlights, thus, indicate how small users are reacting to System/3:

- Price is the primary drawing card. As many users see it, there were simply no low-cost disk systems on the market before System/3. Even the NCR Century 100 was considered too expensive. A number of sites ordering System/3 card configurations plan to substitute disk systems within the next year or so.

- System/3 may be impacting the competition, despite IBM's apparent best efforts to soften the effect of its spry little computer. It is true that some 80% of IBM's orders are from people who have never owned a computer, but quite a few of these would have installed the Century 100, a Univac 9200, or Honeywell's H-115 if System/3 had not come along. But there is still a heavy impact on IBM's own tab installations and current users of the 360/20.

- About half the System/3 orders are pure gravy for the computer industry. People who say they weren't particularly looking for a computer now find themselves bumping elbows in System/3 class, possibly learning to program for the first time.

System/3's importance to IBM, however, is more for the future than the present. By yearend 1970, some 1500 of these computers should be installed in the U.S., representing 4% of IBM's base by number but only 0.5% by value. The impor-

E|D|P Industry Report and Market Review, formerly **E|D|P Industry and Market Report,** is published twenty-four times each year by the International Data Publishing Co., 60 Austin Street, Newtonville, Mass. 02160. Entire contents © 1970 by the International Data Corporation. James Peacock, Managing Editor; Fred Anderson, Carol Chapman, Associate Editors; William Leitch, Contributing Editor; Walter Misdom, Director of Industry Analysis; A. Whelan, Circulation Manager. Editorial ideas and information are collected from numerous industry experts, and are researched and formulated by members of the editorial staff. The information and opinions contained in each issue are based on the best information available, but their accuracy and completeness cannot be guaranteed. Subscriptions: One Year, $75. Single copies, priced as indicated on inside pages, air-mailed same day requested. Prices for multiple copies available on request. Telephone (617) 969-4020. Reproduction without written permission is completely forbidden.

tance of System/3 to IBM is that it has allowed the industry giant to build a bigger base and keep down its dollar market share and protect many of the computer sites that have 360/20s. Eventually, an upgrade to System/3 wouldn't be shocking.

The System/3

This fast computer has moderately paced peripherals, new-sized cards, disk- (but not tape) oriented configurations, and a low price tag. The price, however, is unbundled, so does not include the cost of software or of sending the "IBM man" to school. (Univac and NCR still provide at least part of these gratis.)

System/3 is machine-language compatible with the IBM/360 (and therefore with 370) computers, but it uses a variation of RPG programming language. (For details, see EDP/IR Aug.6, 1969.)

Industry observers wondered initially if users would accept the non-standard punched cards. Also, would users be frightened by what looks like incompatibility with the System/360? To find out about System/3, we talked to 23 users around the country who have one installed or on order, and one man who had cancelled his order. We asked them what they thought about the computer and its related services. Many of them had never had a computer on site, and a few had little personal experience with computers at all. Here's the gist of their reactions:

- The 96-column card is, they think, a good idea. With one exception, the worst said was, "Who cares!" That exception had already switched his order to a GE computer.

- As for conversion to the System/3 -- the rare user with one installed for any length of time had no horror stories to tell. Some managers reported that it went very fast, better than expected.

- DP Managers with System/3s on order expect, not surprisingly, that conversion won't be particularly difficult. (Presumably if they expected real hardship, they wouldn't order in the first place.) Some people, however, mentioned the language differences and said they anticipated "medium difficulty" in getting on the air.

- The "Application Customizer Service" by which IBM generates flowcharts, documentation, and other programming aids for a fee seemed to arouse little interest. Some people used it, some didn't, and nobody either waxed enthusiastic or complained.

- The Basic Systems Centers, where users can test out programs on one of IBM's System/3s to ease conversion, and the education courses got more business. Many users said the centers were good -- but crowded.

- Communications for the System/3 was anticipated by some of the users. They took this into account when they selected it, although the communications capabilities hadn't actually been announced when they ordered. Several said they would eventually go on-line to a System/3 or other computer. For the most part, though, this sample does not reflect the communications uses of System/3.

Replacement of their System/3 was a remote event to most of the DP Managers. Nobody contacted by EDP/IR was worried about possible upgrade compatibility of

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System/3 -- primarily because the DP Managers thought there was a lot of room for expansion within the System/3 itself. Many plan to move up into disk configurations and some see the small computer as having a lot of power not tapped by its current peripherals.

"IBM has a tiger by the tail" is what one man said . . . but to EDP/IR, it seems more as if IBM has its tiger by the reins.

Below the "Small"s

IBM's share of the Small market sector has been somewhat weak in the past. With System/3, it is livening up its competition in that area; but more important, IBM is dipping below the Small market into a new stratum of "Very Small" business users for most of its System/3 orders.

The significance of getting a better grip at the lower end of the computer spectrum is that small users become bigger. Over the next one to three years, they will substitute disk systems for the card systems now being delivered. As IBM comes out with more peripherals, users will beef up their installations with these moneymakers. And eventually they will replace with larger machines . . . although to most this step now seems far in the future.

Breakdown by industry

Early orders of System/3 computers reveal an industry-by-industry distribution (by number) which in some cases is radically different from the distribution of all computers. The table below shows how more than 300 System/3 orders and installations compare to the overall computer population.

COMPUTER DISTRIBUTION BY USER SECTOR
(Percent of numbers -- U.S. only)

	System/3 Sample (Midyear 1970)	All Computers (Jan. 1970)
Non-durable manufact.	25.9%	18.0%
Durable manufact.	32.3	20.8
Financial	5.4	16.1
Wholesale	12.4	4.3
Service bureaus	9.0	9.4
Medical & Educat.	2.1	8.1
State & local govt.	2.4	4.6
Other	10.5	18.7
	100.0	100.0

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In the durable goods area, orders of System/3s by Non-Electrical Machinery Manufacturers have been especially high compared to the computer average. The most striking difference is in the Wholesale group, which in our sample accounts for one out of eight System/3s. Service bureaus and software houses are getting their share of System/3s; by number, their percentage penetration among System/3s is about as large as it is with all computers.

In the Financial area, both Banking and Insurance have signed for relatively few of the small machines. (Banking is a stronghold of NCR, a leader in the Small industry sector, and of Burroughs.) Some other service sector groups have shown very little interest in System/3 so far; examples are AT&T and other communications companies, Utilities, and Educational and Medical institutions. Likewise, the Federal Government seems to have little present use for the System/3.

Some, but not all, of the differences may be explained by extra-fast growth of shipments to some sectors. Wholesalers and Computer Service companies have a rising share of the nation's computers, by number. Conversely, Banking, Communications, Utilities, Education, and Federal Government users are becoming relatively less important in the national market. Also, some sectors go in more heavily for big machines -- the Federal Government is a good example of this.

Policy of restraint

Onlookers credit IBM with a kind of holy ability to control its own future through careful planning of the precise purchase/lease/performance package it offers in any new computer. One of IBM's considerations in putting together the System/3 must have been to preserve its own 360/20 base. Like the 1401s before them, the 360/20s are primarily on rental and by now heavily depreciated.

Because of its size, IBM is concerned with more than merely impacting its own base. There is always the antitrust consideration. With System/3, IBM adds to the pie as well as to its own slice, thereby toning down its penetration.

DISTRIBUTION OF DOMESTIC SYSTEM/3 ORDERS BY USER TYPE
(As of July, 1970)

	% of Sites with System/3 on Order
New users (no installed computers)	80%
IBM users: 360/20	9
1130 and other IBM	8
Non-IBM and mixed sites	3
	100

Therefore, it seems likely that System/3 has been designed and marketed with the aim of not immediately realizing its full potential and of not making heavy inroads into the installations of competitors. This conclusion seems supported by an analysis of System/3 orders, based on information from International Data Corporation, publisher of EDP/IR. The above table shows how System/3s on order

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as of July, 1970, are estimated to be distributed among new users, IBM customers, and users of competing mainframes.

Any incompatibility notwithstanding, around 9% of the orders are to replace 360/20s, probably the lower-priced card systems. It would seem that the real block to massive returns of 360/20s in favor of System/3s is that the new machine is a very small computer in terms of actual throughput. It just can't match the large 360/20s, especially disk systems.

But as time goes on -- and if IBM doesn't introduce a 360/370-compatible machine below the 360/20 -- the company may strengthen the System/3 enough that it will even be competitive at the bottom end of the 360/25.

Other Small computer manufacturers

For competing mainframe manufacturers, whose defecting customers are yielding about 3% of IBM's System/3 orders, the small computer is hardly yet a visible annoyance. Very few of their Small computer customers have opted for it.

It is not true, however, that IBM is delivering to a captive audience unwilling to even consider other makes of computers. Users of tab equipment (so-called "IBM machines"), service bureau customers, and existing computer users all show some tendency to take a serious look at systems from other manufacturers. In our interviews, we found the following:

- Two out of nine tab equipment users had looked at non-IBM computers before ordering their System/3. One was actually about to sign up for a Univac 9200, but changed his mind with the announcement.

- Two out of five customers of service bureaus had seriously weighed a competing supplier. One of them, in fact, ordered a Century 100 but later cancelled.

- Over half the nine people already using computers evaluated small systems from other manufacturers as well as from IBM.

These numbers are too small to prove anything statistically, but they fit the logic which says: IBM tab equipment customers should be most closely tied to their traditional supplier. Service bureau customers, even if they run programs on IBM computers, don't have a direct tie to the manufacturer and should be more likely to try non-IBM equipment. And experienced computer users should be more willing to try a competing supplier because they have the knowledge needed to shop around.

More competition

A lesser-known is also challenging IBM with a slap in the . . . well . . . ankles with its own small business computer. In April, The Singer Company's Friden Division slipped the System 10 onto the scene as a direct competitor to the System/3. Deliveries begin this month. The multiprogramming computer reads standard 80-column cards, uses tape as well as disk, and has communications abilities.

Several peripherals makers have responded directly to System/3 with 96-column card and OCR hardware. Potter Instrument says it will make a line of 96-column card equipment for the OEM market, and it has announced a reader and a sorter. Recognition Equipment will put out the "Input 3," an OCR device renting for from

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$950 to $1400 per month which interfaces with the System/3 and the 360/20. Decision Data Corp., a ten-month-old spinoff from Univac, has announced two data recorders, a sorter, and a card reader, all for 96-column cards.

IBM World Trade is manufacturing the System/3 in Europe and Japan for delivery on the international market. It may find competition to the System/3 somewhat stiffer outside the U.S. than within. In Europe, GE's 55 rents for less than System/3 and is quite popular -- observers there say that GE doesn't seem to be losing much business to System/3. In Japan, IBM will be contending in the market area where Japanese computer makers shine -- and where users spend most of their EDP yen.

Prognosis

To sum up, IBM is in some ways helping and in some ways challenging its competitors, but because inroads into current non-IBM installations are minimal, the effects won't show up right away.

Some new business is being diverted from companies which have traditionally courted first-time users. NCR's Century-100 is the most frequently mentioned non-IBM alternative to the System/3. Also, Univac's 9200 is often in the running.

But at the same time, IBM is manufacturing a new customer base which may later be seized by computer makers advertising the perfect System/3 replacement. The net effect could well be more for everybody.

NCR ANNOUNCES POINT-OF-SALES SYSTEM

The National Retail Merchants Association had plenty to talk about at their Miami meeting last month, because NCR was showing its recently-announced electronic point-of-sales (POS) system -- the NCR 280.

This retail terminal is both a cash register and a data collection device -- a bright one at that, with its own processor. Sales information is captured off-line, but credit checking is handled on-line to a computer. Theoretically, NCR has the $1 billion cash register market to play with, although currently replacements and new purchases of cash registers are just a fraction of that amount. With the new system, NCR may get its lead into retailers' computer operations if potential customers can resist the cajoleries of competing POS makers until mid-1971, when NCR starts delivering.

Chances are most will. National Cash Register is to cash registers what IBM is to computers. Ergo, it is the company most likely to succeed in putting across the POS terminal concept. Several highly-respectable companies are interested in this area -- for example, both Singer and Pitney Bowes-Alpex have similar machines -- but the 280 may well provide the turning point for the cautious retail industry.

Just what the NRMA ordered

Industry observers say that NCR has pretty well met specs which the National Retail Merchants Association is preparing for this kind of register system.

The 280 has the vital ability to stay up even when communications are down, and its blinking lights lead sales people through various kinds of transactions. The terminals tie into a magnetic tape data collector, from which data goes (via communications lines or physically) to the computer.

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NCR people get the most enthusiastic when they describe The Wand, which reads color bars on NCR-designed price tags. With this hand-held scanner, the NCR 280 can accurately inhale information about price, size, style, etc., without the salesperson laboriously keying it in. Getting rid of this manual step in the data capture chain means it is feasible to gather more detailed data for feeding daily -- or nightly -- to the computer. This, according to NCR, is the prime justification for the NCR 280: comprehensive, current information for management.

Oops! Competitors.

They have installations already in the field, sturdy names as business equipment supplier . . . and what's most important, orders from major department stores.

- The Singer Company's Friden Division was a year ahead of NCR with its own Modular Data Transaction System. A specialized group of salesmen familiar with the retail and data processing fields was recruited from outside Friden just to market the system, and from their 3500-unit order backlog, they seem to be successful.

- Pitney Bowes-Alpex has added its SPICE to the POS sauce, and at least two big department store chains have ordered or are on the point of ordering the system. (Pitney Bowes-Alpex is a joint venture of Pitney-Bowes -- the mailing equipment maker which also markets copiers and retail devices -- and Alpex. Pitney Bowes itself recently announced a credit verification terminal.)

- Several companies make specialized terminals for the supermarket market. For instance, Inventory Management Systems is trying out its Marketron in some Los Angeles food stores. This service and equipment supplier may also have a handy by-product from its inventory management services, since it can tell the food producers how their brands are moving.

There are others actively participating or interested. IBM, RCA, Litton, Burroughs, Olivetti, and some less familiar names -- Charecogn Systems Inc., Verifab, Inc., American Regitel Corp., Ricca Data Systems, and Information Machines Corp. -- have all been mentioned in this context.

The way to a merchant's back office is through his cash register

Before its official announcement, NCR had already shown off a prototype 280 to retailers. It is testing the system at Montgomery Ward in Ohio. Orders are starting to come in. At $3470 per terminal, an entire system may sell for from $25K to over $1 million, depending on how big and fancy it is. NCR is not offering to lease the 280.

Besides sinking its teeth into some POS revenues, NCR may get a longer-run payoff. The retail industry uses a reasonable $550 million worth of computer hardware, 2.7% of the U.S. installed value. NCR as a computer company is already strong in the retail sector -- its market share there is twice its overall average -- but no doubt it would like to raise its stake in this familiar territory. The NCR 280 might be a good way to do it. This is, after all, a computerthing, not just another piece of business equipment.

If NCR can sell merchants ways to capture all that wonderful data, it just might sell them ways to use it.

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August 31, - September 11, 1970

	1970 High	1970 Low	2 week Sales in 100's	2 week High	2 week Low	Last	2 week Net Change	2 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	21	1789	33 5/8	30 1/8	33 1/4	+ 7/8	+ 3
American R & D	99 1/2	37 1/8	1861	59 1/2	52 1/2	56 1/2	+ 1/8	+
Ampex Corp.	48 1/2	12 1/2	2976	19 1/2	15 1/2	18 1/2	+ 2	+ 12
Bunker Ramo	14 1/2	6 1/8	1546	9 3/8	7 3/4	8 7/8	+ 7/8	+ 11
Burroughs	172 3/4	78 5/8	3661	115 5/8	102 5/8	105 5/8	- 3 7/8	- 4
Collins Radio	37 1/4	9	1209	14 3/4	12 1/2	14 1/8	+ 1 1/4	+ 10
Computer Sciences	34 1/8	5 3/8	11,239	14 1/8	8	13 1/2	+ 5 5/8	+ 7
Control Data	122 1/2	28 3/4	3358	43 1/2	35 7/8	43	+ 7	+ 19
Data Proc. Fin. & Gen.	32	6 5/8	2044	13 7/8	10 3/8	13 5/8	+ 1 5/8	+ 14
Electronic Assoc.	11 5/8	3 5/8	275	5 7/8	4 1/2	5 5/8	+ 5/8	+ 13
General Electric	80 3/4	60 1/4	2670	80 3/4	76 5/8	80 1/4	+ 1 1/4	+ 2
Honeywell	152	65 5/8	1517	90 7/8	83	90	+ 2	+ 2
IBM	387	218 3/4	3494	276 3/4	259 1/4	268 3/4	- 2 1/2	- 1
ITT	60 1/8	30 1/2	4653	43 1/4	40 3/8	42 3/8	+ 1 3/8	+ 3
Leasco	30 1/2	7	3571	12 3/8	10 1/8	12 1/8	+ 1 7/8	+ 18
Litton	38	15 1/4	7388	21 5/8	18 3/8	21 1/4	+ 1 3/4	+ 9
Memorex	166 3/4	44 1/2	6383	82	66 5/8	78 1/4	+ 8 1/8	+ 12
Mohawk Data Sciences	87	18 1/8	2910	35 3/8	25 7/8	33 3/4	+ 6 3/4	+ 25
National Cash Register	63	29 1/4	2837	39 7/8	36 1/4	38 1/8	- 1 1/2	- 4
Planning Research	53 1/4	13 5/8	1177	23 1/2	18 3/4	21 7/8	+ 1 1/2	+ 7
RCA	34 5/8	18 1/8	3170	27 3/4	23 1/2	27	+ 2 1/2	+ 10
Raytheon	33 5/8	16 1/8	1905	23 1/4	18 5/8	23	+ 3 7/8	+ 20
SCM	24 3/4	11 1/8	1260	16 1/2	13 7/8	15 1/2	+ 1 5/8	+ 12
Sanders	29 7/8	7 1/8	869	13 3/8	11 3/8	12 3/4	+ 1 1/4	+ 11
Sangamo	29 1/8	9 1/8	416	15 3/4	13 1/4	15	+ 1 1/4	+ 9
Singer	85 3/4	53 1/4	499	67	63 1/8	66 1/4	--	--
Sperry Rand	40 3/8	18 3/4	4910	25	22 5/8	23 3/4	--	--
Teledyne	40	13	5263	21	17 1/8	20 3/8	+ 1 7/8	+ 10
Telex	25 7/8	9 1/8	16,752	16	11	15 1/8	+ 3 1/8	+ 26
University Computing	99 3/8	13 1/4	12,155	27 7/8	17	26 3/4	+ 8 3/8	+ 46
Xerox	115 3/4	65 1/4	5511	81 7/8	76 1/2	77 7/8	- 1 5/8	- 2
NYSE COMPUTER STOCK AVERAGE							+ 1.9	+ 9.7
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	3 3/4	208	6 3/8	5 1/4	6 1/8	+ 5/8	+ 11
Automatic D P	47 3/4	23 1/2	1276	38 3/8	32 3/4	35 1/8	- 3/4	- 2
Calcomp	33 7/8	10 1/4	1385	16 3/4	13 3/4	16 1/8	+ 1 7/8	+ 13
Clary Corp.	10 1/2	3 3/8	88	5 5/8	5 1/8	5 1/4	- 1/4	- 5
Computer Applications	12 3/8	2	571	2 3/4	2 1/4	2 1/2	- 1/8	- 5
Computing and Software	75 3/4	16 1/4	775	28 3/4	20 3/4	26 1/4	+ 3 7/8	+ 17
DPA, Inc.	10 3/8	3 3/8	278	5 3/8	3 7/8	4 7/8	+ 5/8	+ 15
Data Products	25 1/2	4 3/4	2823	9 1/2	7 1/8	9	+ 1 1/8	+ 14
Digital Equipment	124	48 3/4	1539	78 3/8	69 1/4	71 5/8	+ 5/8	+ 1
Granite Mgt.	22 1/4	7 3/8	216	11 1/2	10 1/8	11 3/8	+ 1/8	+ 1
Greyhound Computer	14 1/8	5	269	9 1/2	7 1/2	9	+ 1 1/2	+ 20
ITEL	25 1/2	6 1/8	984	12 1/2	9 1/4	12 3/8	+ 2 1/4	+ 22
Levin-Townsend Comp.	19 3/8	3	1044	7 1/4	5 1/8	7	+ 1 5/8	+ 30
Milgo Elect.	40 1/2	15	8104	26 5/8	20 3/4	26 3/8	+ 1 3/8	+ 6
Potter Instrument	42 3/4	14 5/8	1308	24 3/4	19 7/8	24	+ 2	+ 9
Sys. Eng. Labs.	49 1/8	10 1/8	2347	17 3/8	13 1/4	17	+ 2 5/8	+ 18
AMSE COMPUTER STOCK AVERAGE							+ 1.2	+ 10.3

	1970 High Bid	1970 Low Bid	September 11, Bid	September 11, Asked	2 weeks ago Bid	2 week net change Bid	2 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	8	1 1/4	1 3/8	1 3/4	1 1/4	+ 1/8	+ 10
Bolt, Beranek & Newman, Inc.	11 1/4	5 1/2	7 5/8	8 1/8	6 3/8	+ 1 1/4	+ 20
Computer Usage	8 1/2	2	4 1/2	5 1/4	2 1/2	+ 2	+ 80
DASA Corp.	44	3 3/4	4 1/2	4 7/8	5 1/8	- 5/8	- 12
Digitronics	13 3/4	4 1/4	5	5 3/4	4 1/2	+ 1/2	+ 11
Fabri-Tek	8 1/2	2 7/8	4	4 3/8	3 1/4	+ 3/4	+ 23
Informatics, Inc.	20 1/2	4 1/4	6	6 3/8	6 3/8	- 3/8	- 6
LMC Data, Inc.	3 5/8	1 1/4	1 1/4	1 3/4	1 3/8	- 1/8	- 9
Management Assistance	4	1 1/4	1 5/8	1 7/8	1 5/8	--	--
Optical Scanning Corp.	52	11	21 1/2	23	19 1/2	+ 2	+ 10
Recognition Equipment, Inc.	83 1/2	12 1/2	20 1/8	20 5/8	18	+ 2 1/8	+ 12
TBS Computer Centers Corp.	27	4 1/2	5	6 1/2	6 1/2	- 1 1/2	- 23
Tally Corp.	23	9 1/2	13 3/4	14 3/4	11 3/4	+ 2	+ 17

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" NOVEMBER 6,1970 • VOL.5,NO.22 P.J.McGOVERN,EDITOR

AFTER THE RECENT ROUND OF PRODUCT ANNOUNCEMENTS, THE ROAD FOR MOST MAJOR MANUFACTURERS DURING THE EARLY 1970s SEEMS CLEAR

IBM is boldly advertising that it is "The company behind the computer."

Supporting this new hard sell strategy, IBM has indicated an even harder push into the accounting machine market with the System/3 Model 6 just announced; it has implied a push for far broader industrial use of computers with the very low-priced System/7; it has demonstrated in these products and in the 370/145, technological leadership that in the past has been unusual for IBM.

During the coming months, isolated additional product introductions are to be expected from IBM and from others; but enough has been said during the current round of "major" announcements from mainframers so that a fairly accurate picture can be painted of the marketing direction they are set on for the early part of the 1970s. In a nutshell:

- IBM, apparently adopting an even more aggressive approach than in the past, will pursue a three-pronged course . . . upgrading current rental customers; switching IBM users with either purchased or third-party-leased systems back to paying rental; opening new markets in both industrial and office applications.

- RCA virtually turned to corporate oversell when it announced four new computers; but what it really said was that it is going to try to out-IBM the Industry Giant . . . to outmarket the marketing master. In doing so, RCA put a bright new polish on several present-day members of its Spectra line -- relabeling them the 2, 3, 6, and 7 -- and relying for success on a heavily beefed-up marketing staff . . . many of them ex-IBMers.

- Burroughs' new Series 700 is actually a cost-improved version of today's large 500 line. All the current industry buzzwords have been attributed to the new family -- and most of them are probably deserved. But Burroughs' strategy seems to be to try, gradually, to upgrade current customers and to go after new ones with selective applications.

- NCR, as expected, has announced its Century 300. In addition to providing the upgrade potential that has always been implied for the Century Series, this computer also opens up new potential for NCR. With a monthly rental of $15,000 to $40,000, the 300 will be NCR's first entry into the medium-to-large computer marketplace.

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The outlook for the other mainframe manufacturers is pretty much as it was at midyear (EDP/IR Sept.9,1970): Honeywell has its hands full integrating the previous GE operation into a restructured HIS and deciding on a new product line for announcement sometime next year; Univac is expected to introduce its large-scale 1110 machine shortly, and to further beef up its 1100 series; Control Data is a question mark to many, with its business hurt by government and aerospace spending cutbacks and a stronger entry into the commercial area looking even more necessary than ever.

So the stage is set.

While reporting the events and announcements described overleaf, EDP/IR has also been analyzing the various products announced and evaluating how they fit into the expected marketing picture for the computer industry over the next several years. In the remainder of this issue, therefore, we will describe the products that have been announced and present our analysis of their impact.

NEW COMPUTERS BASED ON COMPATIBILITY, USER CONVENIENCE

Rather than having a "new generation" of computers, what the manufacturers seem to be providing is a "user round" of products. All the new computers announced during the last month or so are compatible with earlier offerings from the same manufacturer; most of the systems offer larger main memories and improved auxiliary storage devices.

Thus, the computer customer during the next few years can plan for better price/performance from his new equipment . . . with the assurance he won't face the horrendous conversion problems that users suffered through during the mid-1960s when third-generation computers -- especially IBM/360s -- were delivered.

The upgrade philosophies of various manufacturers are somewhat different in style, even though they agree in principle. Here's a rundown on mainframe announcements that have come out since IBM introduced System/370 last summer (EDP/IR July 9,1970).

IBM CONTINUES ITS PARADE OF NEW PRODUCTS

The initial announcement of System/370 (EDP/IR July 9,1970) surprised most observers because of what it didn't include. The 370/155 and 370/165 promised pleasantly better price/performance for users, but the architecture looked much like that of the 360/85 or 360/25. The faster line printer and the new 3330 disk drive appeared to many as the most exciting aspect of the announcement.

But when IBM made public the details on the third member of System/370 -- Model 145 -- it may have sneaked a superstar into its new line. The computer user finally got a look at the new series of computer he had been expecting (EDP/IR May 18, 1970). It contains all monolithic logic and memory, a component change considered important by many. But the most important aspect of the 370/145 (an aspect which seems to depend on having monolithic memory available) is a feature announced by IBM as Reloadable Control Storage (RCS) and talked about by IBMers even upon announcement as the "floppy disk."

The central processor of the 370/145, it seems, contains only the simplest of instructions, and might be described as a true Turing machine, the theoretical all-purpose computer that can accomplish any feat given enough time. The basic in-

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struction set -- as well as the instruction set for certain earlier IBM models and the control function for all the peripherals -- can be loaded from the 45-rpm-sized floppy disk, mounted at the console, into the control memory at the beginning of operations.

Using this feature, IBM offers not only System/360 compatibility but free emulators for all 1400 series computers and the 7010. These machines make up over half of IBM's installed base of second-generation computers.

Also, because peripheral controls are located in main memory, IBM was able to announce the 2319 disk pack drive. This three-spindle, 2314-type drive has somewhat shaken up many of the independent plug-to-plug memory manufacturers. The 2319 needs no controller and, as a result, is about half the price of a comparable IBM three-spindle drive with controller. Even the three spindles themselves (the user pays about $500 rental to have the control functions on his floppy disk) are priced almost 50% below the previous price for three spindles from IBM.

Marketing overtones of System/370

To fully appreciate the "method" behind what may seem IBM's rather disjointed announcement of its System/360 replacements, one must understand the nature of the IBM installed base (about $21.5 billion at yearend 1969). Not all IBM computers -- in fact, only 61.5% of them by value -- were providing rental income to IBM as this year began. Some 25% by value of all IBM computers are owned outright by users themselves, and an additional 13.5% are owned by third-party leasing companies who, in effect, re-rent them to users at reduced rates.

These non-owned machines (from IBM's point of view) are worth over $8 billion and their users constitute the single largest group of computer customers that IBM can go after for "new" business. Also, these customers are IBM's soundest prospects for new business, since:

a) they are already committed to IBM equipment; and

b) returning them to the "fold" would have none of the antitrust implications that IBM would face if it attempted to focus on displacing the computers of other mainframe manufacturers.

Indeed, by going after this market as well as trying to upgrade current customers, IBM is in a perfect position to significantly increase its rental base while at the same time allowing competitive mainframe manufacturers to increase their penetration of the total installed computer base.

No manufacturer -- much less IBM -- calmly sits back and outlines its marketing strategy. But a careful analysis of announcement timing combined with an understanding of installed base begins to give very pertinent hints as to what course a manufacturer is taking. Consider the table on page 4.

IBM is most secure with its base of small third-generation computers -- the 1130s, 360/20s, 360/25s, and 360/30s. It receives rent on almost three-fourths of them. Thus, it has not introduced the expected 370/135, and may not for some time to come. On the other hand, it receives rent on less than 60% of the larger 360s (Model 40 and up), and only on just over 40% of the second-generation equipment it built during the early 1960s. There's no wonder, then, that IBM first announced a replacement for its large computers, and that it followed shortly with a middle-class machine that can emulate over half its second-generation equipment.

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ANALYSIS OF IBM's WORLDWIDE INSTALLED BASE
(Yearend 1969: Total Installed Value = $21.5 Billion)

Model Class	% of Total By Value	% Distribution by Value within Model Class		
		On Rent	3rd Party Purch.	User Purch'd
Second Generation	18.0%	41.0%	2.5%	56.5%
Small 3rd Generation	37.5%	74.0%	13.0%	13.0%
360/40s and Larger	44.5%	59.5%	18.0%	22.5%
TOTAL	100.0%	61.5%	13.5%	25.0%

Source: International Data Corporation Computer Installation Data Files

Even without taking a strong swat at the third-party leasing base (and industry talk is that IBM is not overly concentrating in this area . . . again for anti-trust reasons), IBM can sit and look at over $5 billion worth of equipment that, if replaced by upgraded systems and put on rental, could pour probably $1.6 billion worth of rental income into its corporate coffers each year.

In addition, some users with their third-party leases running out during the next year or two are going to switch. A recent EDP/IR survey of "large" computer users indicates that about 40% to 45% of the third-party leasing customers are giving serious consideration to a 370/155 or 370/165. The highest interest -- over 50% -- is concentrated among current users of 360/50s.

Proverbial camel's nose . . .

But IBM hasn't decided simply to enlarge existing markets; it is going after one of its heretofore untapped markets, Industrial Control. With its System/7 -- a mini-like computer -- IBM has a new tool for entering a new marketplace. It looks as if IBM has decided to enter the factory and warehouse with the same force it entered the accounting office with the 1401 as the 1960s began.

System/7 will be covered in detail in the next issue as we take a closer look at many of the dedicated application computers being marketed today. In a nutshell, however, System/7 -- priced as low as $350 per month -- is a processor designed for installation in hierarchical, sensor-based systems and will be marketed for applications where large numbers of input and output signals are necessary for the computerized control of a process or procedure.

. . . seeks more and more tents

And IBM hasn't forgotten its accounting-based business. Last summer (EDP/IR Aug.6,1969), IBM introduced its System/3. And along with the System/7, it introduced a lower-priced version of the S/3, a computer IBM boldly claims has been delivered to over 1000 users. The new version, called Model 6, is another attack on the commercial side of the computer business. IBM's new unit promises to extend the impact of the computer even deeper into the affairs of the typical office.

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This new computer -- rather than simply being an upgrade for punched-card systems as was the original S/3 (now called the Model 10) -- is designed for accounting or small banking applications, and can work with ledger cards or read MICR language. In its "typical configuration," the S/3 Model 6 has a keyboard/operator station that inputs directly to disk; a single-spindle, two-disk drive that holds 2.45 million bytes; 8K bytes of memory; and rents for $1015 a month. The printer connected to the keyboard is of the wire matrix type. It prints 85 characters a second and can be provided in a configuration that prints both going and coming as the print head goes back and forth across a piece of paper.

IBM contends that the Model 6 is not a replacement for anything, except perhaps manual labor; it is "just another product in our line," an attempt to bring ledger-card business into the IBM base. IBM attempted to penetrate this base of business several years ago when its Office Products Division brought out the non-successful 6400: Now, apparently, IBM has decided to attack the same base from the computer side. Many commissions will be riding on this one.

. . . and speaking of key entry

Just this week IBM showed that it will react to competitive inroads, when necessary. Univac has been replacing IBM's separate keypunch and verifier units since late 1968 with its 1710 keypunch/verifier. Finally, the threshold level was reached and the Giant reacted; the counter is a "keypunch with a memory," IBM's 80-column Model 129. This new recorder combines keying and verifying in one machine (as does Univac's) through the use of a monolithic buffer memory which lets an operator make corrections before a card is actually punched.

Keypunches are losing out to more sophisticated data capture methods such as key-to-tape and key-to-disk (EDP/IR May 4,1970). Even regrooming won't make the workhorse keypunch compete with tape-oriented entry -- cards are simply losing favor among computer users. IBM's new product announcement seems aimed at containing Univac's encroachment on its keypunch revenues. Currently, Univac has 6% of the keypunch base, by number of units. But for IBM's announcement, Univac's share would have risen to 15% or more by 1973, according to projections by International Data Corporation, publisher of EDP/IR.

The Model 129 keypunch/verifier is IBM's response to a minor threat in an unexciting corner of its business. But why not? Keypunching is going to survive for quite a while longer, and the 129s will be bringing in revenues long after they have been depreciated off IBM's books.

A new mag tape system on the memory market

IBM's other new offering this week is the Model 3420 tape system. Unlike the 3330 and 2319 disk units, which will be shipped primarily to 370 users, this tape drive and controller is a potential replacement for many drives currently on 360 computers, as well as going to future 370 customers. Its most prominent aspect is lower price, and it appears to be very competitive with independently supplied tape units (EDP/IR Aug.17,1970). The new drive also appears to be more reliable and easier to maintain than the old Model 2420.

There are three editions of the 3420 drive; the higher-speed version is 40% cheaper than IBM's current comparable drive, and the two lower-speed versions are 10 to 15% cheaper. If the 2319 disk was one hole in the umbrella, the 3420 tape system is another.

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BURROUGHS CONTINUES ITS COURSE WITH THE "700 SYSTEMS FOR THE 1970s"

Pulling out almost every buzzword in computerese, Burroughs' top brass recently gathered with the computer press in New York City and announced three models in a "new family" of computers -- designated the Burroughs 700 Systems. Starting with the B-5700 that has about the same monthly rental as today's B-5500, the family so far includes the larger B-6700 and giant B-7700. All the computers are organized around multiple processors, and have the following characteristics:

- Programmer independent virtual memory through automatic program segmentation, memory allocation, and re-entrant code.
- Multiprograming and multiprocessing under the Master Control Program and advanced architecture in which independent computing, memory, and input/output elements interact through a central exchange.
- Efficient, economical data communications.
- System expansion without reprogramming, accomplished through dynamic allocation of resources to accommodate the added equipment.
- Programing in compiler languages exclusively.

As if there isn't enough computer jargon in the description offered above, Ray W. Macdonald, president of Burroughs, interjected a few more ideas in his remarks: "The dynamic allocation of resources made possible by the MCP is also the key to the efficient 'fail-soft' characteristics found in the new 700 systems. . . The new B-6700 has the highest level of demonstratable fail-soft capability of any computer in use today."

Deliveries of the B-6700 begin in February, and current B-6500s can be field upgraded to the B-6700.

The new Burroughs family, in fact, appears to be a line of cost-reduced "500s" with more performance. The B-5700, which will rent in the $15,000-to-$50,000 a month range, is some 15% to 25% less expensive than a similarly configured B-5500 and will give the user about four times the performance, Burroughs says. The new B-6700 will deliver two-to-five times the throughput of the B-6500, at rentals from $30,000 to $180,000, and the B-7700 is said to provide two-to-ten times the performance of the B-6700. The 7700 comes in configurations with up to eight central processors and can rent for as much as $300,000 a month.

The 700 family obviously has evolved from the original design of the B-5000, first delivered in 1963. Burroughs, therefore, is likely to continue with its current marketing strategy based on upgrading of present customers and concentrating on specialized application areas. With the most loyal customer base of any major computer manufacturer . . . and with over three-fourths of its larger computers on rental . . . Burroughs should be able to succeed with this approach.

NCR ENTERS NEW CENTURY

Unlike RCA and IBM, NCR's new offering keeps the family name of the successful Century computer line. And, with the Century 300, NCR hopes to keep hold of customers who are happy with its gear but would like to upgrade from the C-200. Now, those who can wait till early 1972 for delivery can move up to a C-300 which

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features on-line, real-time processing, a very large core memory, and a new high-speed drum memory.

Naturally, the new machine is compatible with the Century 100 and 200. It too offers NCR's Neat programming language, as well as Cobol and Fortran. There are 1700 of the small C-100 and C-200 computers in the U.S. and abroad, and at NCR's current shipment rate, that number will be considerably bigger by 1972. So far, the company's customer losses have been primarily from its second-generation systems, including the 315 and the 500 models (EDP/IR May 4,1970). The Century 200 has been installed only a few months, at most user sites, so few have had time to outgrow it. But eventually they will, and thanks to the Century 300, NCR's earlier raids on the small computer market may pay off well.

RCA TAKES DIRECT AIM ON IBM'S INSTALLED BASE

In mid-September, RCA's president Robert Sarnoff came to Marlboro, Mass. -- future home of the company's computer operations -- to trumpet the launching of a broad attack on the heart of IBM's computer market. The manufacturer's ammunition is repriced editions of the Spectra 70/45, 46, 60 and 61, with expanded memory capacity, labeled the RCA 2, 3, 6, and 7; its targets are IBM's 360/30, 40, and 50 installations, with an installed value of nearly $9 billion. RCA in effect aims to detour a portion of the IBM 360 users from a migration to the 370/145, 155 and eventually the 135, and steer them to the security of the RCA camp. The electronics giant hopes to one-up IBM in these areas:

- o Price/performance. RCA claims that its new machines give clearly better performance per dollar than third-generation computers in their class. As for System/370, RCA banks on the upgrading user being more interested in extra memory capacity than he is in extra power. The unexpectedly low cost of IBM's 145 will probably give RCA more price competition than it counted on.

- o Virtual memory. This part of the price/performance package goes beyond anything IBM offers for medium-to-large computers. RCA says that over half of third-generation computers are memory bound. Thus, its models 3 and 7 should sell on the basis of their "virtual memory," a combination hardware and software technique which permits one to treat secondary storage on drums and disks as part of main memory capacity.

- o Guaranteed conversion. RCA is promising to write fixed-price conversion contracts with certain broad groups of 360 users. These provide for penalty payments if RCA can't convert the user's old software on time and, as an option, up to pre-set standards. This "innovative business policy" will certainly make defection to RCA a less anxious decision for some IBM customers, but its importance is diluted by the fact that 360-to-370 conversion isn't expected to be too difficult.

Last summer EDP/IR analyzed RCA's corporate goal of becoming Number Two in the U.S. computer market (Aug.31, 1970). We quoted Ed Donegan, General Manager of the Computer Systems Division, to the effect that RCA is now going to put its money where its mouth was. Robert Sarnoff reaffirmed this on Sept. 15: RCA will commit whatever resources are necessary to make its bid in the computer industry. That's a lot of mouth, and a lot of money.

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September 14, - October 9, 1970

NEW YORK STOCK EXCHANGE	1970 High	1970 Low	Sales in 100's	1970 High	1970 Low	Last	4 week Net Change	4 week % Change
Addressograph-Multigraph	62	21	7487	36 7/8	30 1/4	30 1/2	- 2 3/4	- 8
American R & D	99 1/2	37 1/8	4562	74	54	62 1/4	+ 5 3/4	+10
Ampex Corp.	48 1/2	12 1/2	8076	21 3/4	17	18 5/8	+ 1/8	+ 1
Bunker Ramo	14 1/2	6 1/8	4363	11 1/4	8 1/4	9 1/2	+ 5/8	+ 7
Burroughs	172 3/4	78 5/8	8055	127 1/8	102 1/4	117 1/2	+11 7/8	+11
Collins Radio	37 1/4	9	2689	19 1/4	13 1/8	16 3/4	+ 2 5/8	+19
Computer Sciences	34 1/8	5 3/8	16,426	15	11 1/2	11 7/8	- 1 5/8	-12
Control Data	122 1/2	28 3/4	10,427	53 3/4	40 1/4	48 3/8	+ 5 3/8	+13
Data Proc. Fin. & Gen.	32	6 5/8	6045	17 3/8	12 3/8	14 7/8	+ 1 1/4	+ 9
Electronic Assoc.	11 5/8	3 5/8	1215	8 1/8	5 1/8	6	+ 3/8	+ 7
General Electric	86 7/8	60 1/4	6764	86 7/8	78 3/4	84 3/8	+ 4 1/8	+ 5
Honeywell	152	65 5/8	4054	93 1/4	85 1/8	85 5/8	- 4 3/8	- 5
IBM	387	218 3/4	7981	309 3/4	263 1/4	296 1/8	+27 3/8	+10
ITT	60 1/8	30 1/2	12,860	47	41 1/8	44 7/8	+ 2 1/2	+ 6
Leasco	30 1/2	7	14,821	16 7/8	11	14	+ 1 7/8	+15
Litton	38	15 1/4	14,090	27 3/8	20 1/2	24 1/8	+ 2 7/8	+14
Memorex	166 3/4	44 1/2	17,842	101 3/4	75	83	+ 4 3/4	+ 6
Mohawk Data Sciences	87	18 1/8	5525	41 1/2	30 3/8	35 3/8	+ 1 5/8	+ 5
National Cash Register	63	29 1/4	11,145	45 5/8	36	41 1/2	+ 3 3/8	+ 9
Planning Research	53 1/4	13 5/8	3397	27 3/4	21 1/8	22	+ 1/8	+ 1
RCA	34 5/8	18 1/8	5300	27 1/2	25 3/8	25 7/8	- 1 1/8	- 4
Raytheon	33 5/8	16 1/8	3161	26 3/8	21	23 1/4	+ 1/4	+ 1
SCM	24 3/4	11 1/8	3798	17 1/2	13 1/4	16 1/4	+ 3/4	+ 5
Sanders	29 7/8	7 1/8	2372	17 3/4	11 5/8	15 3/4	+ 3	+24
Sangamo	29 1/8	9 1/8	1872	18 1/2	13 5/8	15 7/8	+ 7/8	+ 6
Singer	85 3/4	53 1/4	1928	70 7/8	64 5/8	68 3/8	+ 2 1/8	+ 3
Sperry Rand	40 3/8	18 3/4	7048	29 1/4	22 7/8	26 1/2	+ 2 3/4	+12
Teledyne	40	13	12,615	24 1/2	19	21	+ 5/8	+ 3
Telex	25 7/8	9 1/8	57,073	23 1/4	14 1/2	20 3/4	+ 5 5/8	+37
University Computing	99 3/8	13 1/4	26,311	36 5/8	23 1/8	31 3/8	+ 4 5/8	+17
Western Union	48 1/4	31	4924	40 3/8	32 1/4	36 3/8	+ 3 1/2	+11
Xerox	115 3/4	65 1/4	14,507	91 3/4	75 1/2	86	+ 8 1/8	+10
NYSE COMPUTER STOCK AVERAGE							+ 3.1	+ 7.8
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	3 3/4	845	8 3/4	5 5/8	7 1/4	+ 1 1/8	+18
American D P	47 3/4	23 1/2	2646	42 1/2	35	39 5/8	+ 4 1/2	+13
CalComp	33 7/8	10 1/4	7880	27 1/2	15 3/8	26	+ 9 7/8	+61
Clary Corp.	10 1/2	3 3/8	323	5 1/2	4 3/4	4 7/8	- 3/8	- 7
Computer Applications	12 3/8	2	2417	3 5/8	2	*	--	--
Computing and Software	75 3/4	16 1/4	2348	36 1/4	25 3/8	31 1/8	+ 4 7/8	+19
DPA, Inc.	10 3/8	3 3/8	3937	6 1/4	4 1/2	5 3/8	+ 1/2	+10
Data Products	25 1/2	4 3/4	7451	10 3/4	7 3/4	8 1/4	- 3/4	- 8
Digital Equipment	124	48 3/4	5575	90 3/8	70	77	+ 5 3/8	+ 8
Granite Mgt.	22 1/4	7 3/8	872	14 3/4	10 3/4	12 5/8	+ 1 1/4	+11
Greyhound Computer	14 1/8	5	382	10 1/8	8 1/8	8 1/2	- 1/2	- 6
ITEL	25 1/2	6 1/8	3714	15 1/2	11 5/8	13 1/2	+ 1 1/8	+ 9
Levin-Townsend Comp.	19 3/8	3	2496	8 1/4	6	6 1/8	- 7/8	-13
Milgo Elect.	40 1/2	15	15,312	38 1/4	24 3/4	36 1/8	+ 9 3/4	+37
Potter Instrument	42 3/4	14 5/8	1956	27 5/8	21 1/2	22	- 2	- 8
Sys. Eng. Labs.	49 1/8	10 1/8	10,836	24	15 5/8	19 1/4	+ 2 1/4	+13
AMSE COMPUTER STOCK AVERAGE							+ 2.4	+10.5

OVER-THE-COUNTER	1970 High Bid	1970 Low Bid	October 9, Bid	October 9, Asked	4 weeks ago Bid	4 week net change Bid	4 week % change Bid
Aries Corp.	8	1 1/4	2 5/8	3 1/8	1 3/8	+ 1 1/4	+91
Bolt, Beranek & Newman, Inc.	11 1/4	5 1/2	8 1/2	9	7 5/8	+ 3/4	+10
Computer Usage	8 1/2	2	4 1/4	4 3/4	4 1/2	- 1/4	- 6
DASA Corp.	44	3 3/4	6 5/8	7	4 1/2	+ 2 1/8	+47
Digitronics	13 3/4	4 1/4	5	5 3/4	5	--	--
Fabri-Tek	8 1/2	2 7/8	3 7/8	4 1/4	4	- 1/8	- 3
Informatics, Inc.	20 1/4	4 1/4	8 3/4	9 1/8	6	+ 2 3/4	+46
LMC Data, Inc.	3 5/8	1 1/4	1 5/8	2 1/8	1 1/4	+ 3/8	+30
Management Assistance	4	1 1/4	1 5/8	1 7/8	1 5/8	--	--
Optical Scanning	52	11	19 1/2	21	21 1/2	- 2	- 9
Recognition Equipment, Inc.	83 1/2	12 1/2	19	19 1/2	20 1/8	- 1 1/8	- 6
TBS Computer Centers Corp.	27	4 1/2	5	6 1/2	5	--	--
Tally Corp.	23	9 1/2	15 1/2	16 1/2	13 3/4	+ 1 3/4	+13

* Trading halted.

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" NOVEMBER 18,1970 • VOL.5,NO.23 P.J.McGOVERN,EDITOR

IBM ENTERS MINICOMPUTER MARKET WITH SYSTEM/7 AS DEC's FIRST QUARTER GROWTH SETTLES TO "MERE" 18%

It's a study in contrasts: While the minicomputer leader, Digital Equipment Corp., is delivering thousands of computers on a virtual off-the-shelf basis, IBM promises to ship the first of its System/7 units -- its initial offering in the minicomputer market -- by November . . . 1971. In a market sector where others sell, IBM offers to rent. Where others are slashing prices, IBM raises a lofty price umbrella. And where seasoned mini makers are beginning to satisfy the demands for better software -- IBM announces a "black box."

Is that any way to crack a market? Especially one just feeling the economic slowdown? It is . . . if you're IBM and therefore capable of opening up a vast, undeveloped territory for minicomputer applications: that of industrial control via minicomputer-terminals (the System/7) on-line to a large host computer. The ultimate effect on such leading contenders as Digital Equipment, Honeywell/CCD, Hewlett-Packard, and Varian depends on whether it is indeed possible for IBM to bring "real-time sensor data into the mainstream of information processing" without shrinking major markets for the other mini makers.

About nine months ago, EDP/IR scanned the minicomputer arena (Jan.21,1970). Today, although overall demand for mini's is still healthy -- the number in use will increase by a third during 1970 -- individual companies are fighting for market status and, in some cases, for survival. Here are some episodes in the contest:

- Digital Equipment Corp. at its annual meeting last month had to explain to stockholders why its first quarter sales growth of 18% brought no change in profits. The reason was that DEC expanded in anticipation of a level of sales growth that didn't materialize. It didn't materialize because when Congress, the Ford Foundation and company controllers all trim their budgets, even minicomputer buyers sense a change.

- New minicomputer announcements appear frequently as the suppliers try to out-do each other in price, systems architecture, and technology. In October, Data General, an energetic two-year-old, brought out an all-semiconductor memory version of its Supernova. The advanced technology puts this machine in the same speed class as IBM's System/7. DEC is expected to counter shortly with a comparable version of its PDP/11 -- the medium-priced star of its current family.

- DEC's 12-bit PDP-8/E ducks below other DEC models to sell at about $5K. Interdata and Lockheed are two other manufacturers shooting at the low end of the market, with 8- and 16-bit mini's, respectively.

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- As these maneuvers take place, two giants of the electronics field -- with substantial internal markets to absorb production in the immediate post-announcement period -- have unveiled new mini's. One entrant is Westinghouse Electric, an oldtimer in the process control computer business with its Prodac series. It is courting a broader range of customers with a new 16-bit mini, the 2500. The other is Texas Instruments, which brought out two medium-sized minis at the 1970 SJCC.

IBM is entering a scene of confusion, but not devastation.

Both DEC and Interdata can claim revenue growth of around 20% for their most recent quarters. But while DEC maintained its earnings, Interdata's fell. General Automation, Inc., whose sales bounded from $2 to $7 1/2 million during fiscal 1970, is muscling in on the American and European markets. It justifies its losses by pointing to its fast expansion and says that it is almost at the breakeven point. Data General, with its own sharp sales growth, is already in the black.

On the other hand, Scientific Control Corp. is up against the wall after Chapter XI proceedings; EAI's losses are mounting after the economic downturn added injury to the insult of a lagging analog-hybrid market; Viatron is fending off rumors that it is quitting the mini business; and, word is, BIT's being bought.

For other, more diversified front-runners, it's hard to tell how profitable the minicomputer segment of their business is. But judging by shipment and backlog data, Hewlett-Packard, Varian, and Honeywell/CCD are quite successful.

This time, IBM does not mean "Business"

The System/7 minicomputer announced by IBM in a doublebarrelled press conference last month (EDP/IR Nov.6,1970) is a fast little machine for industrial and lab control and measurement. Starting at $352 a month, it is capable of standalone operation, but it is more likely to be used on-line to a big host computer.

System/7 has a 16-bit, monolithic circuitry, 400-nanosecond processor with memory capacity expandable from 2K to 16K words. While its word-size and extremely fast speed would seem to make System/7 competitive with current mini models, characteristics such as limited maximum memory, high price, and dependence on a "host" computer limit its market.

Not much has been said about System/7 software, except that its host computer may compile programs. One minicomputer vendor contacted by EDP/IR remarked that the IBM mini would probably be hard to program without the larger machine. One of IBM's selling points has always been its application software support, and as time goes on it will probably build a library of System/7 programs for specific on-line applications in IBM's target markets.

While System/7 starts at $16,000 purchase, a 4K-memory system with an operator's console will run over $20,000. That's why competing manufacturers call this a high-priced machine. With so many suppliers hawking low-priced black boxes, OEM buyers are not likely to be attracted to the System/7.

With the proper marketing drive and appropriate enhancements to System/7, IBM could steal sales from current minicomputer makers. While their existing installations cannot be readily displaced because they were sold, not rented, these vendors ship thousands of new minis each year. But the opinion among mini makers seems

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to be that IBM will blaze new trails . . . which will eventually benefit everyone. They feel that when the customer's financial and DP management have been sold on the idea of using a mini as a measurement and control station on-line to the company's big computer, mini makers can step in with their own low-priced machines.

DEC is optimistic

In fiscal 1970, ended in June, Digital Equipment's net jumped 54% and its revenues, 48%. But during the next three months, profits leveled off and sales growth relaxed to 18% over last year's first quarter. One reason is a slow market for DEC's PDP-10 time-sharing computer; the other is the delayed impact of the economic slowdown on demand for dedicated application computers.

Minicomputers sell both in applications where they substitute for less efficient non-computer devices -- such as many control operations -- and in applications possible only through use of a computer -- such as key-to-disk entry of data into a computer. In the first case, mini's have far to go before they have saturated the market, even during a slowdown. In the latter case, sales of minis are limited by demand for the end-product. In the following chart, EDP/IR has analyzed minicomputer demand by its principle application areas:

CURRENT TRENDS IN U.S. MINICOMPUTER DEMAND

Application Area	Prognosis
Scientific & Lab. Instrumentation Control, Data Acquisition, Analysis & Reduction & Other R&D.	This major market for minis for end-user instrumentation began to soften in the fourth quarter of 1969 due to Federal budget cuts. Estim. shares of mini sales: 1969, 20%; 1970, 15%; 1971, 12%.
Process & Numerical Control, Industrial Automation, Typesetting & Automatic Testing.	This market section, accounting for about 45% of mini sales in 1969, did not increase its market share in 1970 due to general weakness in the economy and the drop in plant and equipment spending.
Data Entry Equipment.	Use of minis in OCR, Data Collection and multiple station Key-to-Tape or -Disk systems showed good growth through June, 1970, but has slowed substantially since. This is due to a weak OCR market, stiff competition in the Key Entry area, and financial difficulties for some OEM customers. Estimated share in sales: 4% in 1969; 5% in 1970.
Communications, Message Switching, Control, & Data Terminal Equip.	This is the fastest growing major application for minis and should keep that position over the next four years. Est. sales share: 1969,20%; 1970, 25%.
Educational Systems and Instructional Use.	The decline in Federal funds for general education and for university R&D reduced this application's market share from 6% in 1969 to 5% in 1970.
Applications for Free-standing Small Computers.	Tightness in the economy has held this application's market share to a steady 5% during the 1969-1970 period.

A case in which the demand for an OEM customer's end product determines his need for minis is the key-to-disk area (now a very small element in minicomputer sales). Manufacturers are holding off massive buying of minis until their own prospects improve. They have, however, already designed and tested their computer based systems and, as a DEC spokesman put it, when the economy picks up this market for minicomputers will take off like a stretched rubber band.

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That's why DEC is optimistic. It has been sending its sales force (beefed up from 300 to 400 people since January) out to sell the concept of minis. DEC says that people are interested -- they just can't commit the money right now. Continued sales activity in the mini market is significant. Although some manufacturers have laid off sales personnel, most are expanding or at least holding the line. Instead of foregoing revenues completely, the aggressive marketeers may just see orders and deliveries postponed, with a corresponding bonus of activity when capital spending picks up.

The bigger picture: Dedicated Application Computers

Minicomputers -- generally priced under $25K in their "basic" configurations -- represent only part of the "Dedicated Application Computer" installations reported in EDP/IR's Computer Census. The estimated market shares of the table below won't necessarily be the same as company shares in the minicomputer portion of the market.

DEDICATED APPLICATION COMPUTERS
Share of U.S. installed base as of July 1, 1970

Manufacturer	% of Value*	% of Number	Manufacturer	% of Value*	% of Number
DEC	20%	36%	Collins Rad.	3%	neg.
Contr. Data	18	7	Westinghouse	2	2
IBM	13	4	Raytheon	2	2
Hon/CCD	9	8	SEL	2	1
H-P	6	8	Comp. Aut.	2	1
GE	5	2	EMR	1	neg.
XDS	5	4	SCC	1	1
Varian	3	7	Other	8	17

*Values were calculated using the "basic" system price shown in the Group B Census.

Prognosis

Minicomputer suppliers are making some changes in where, how, and to whom they market their machines as they try for volume sales and some amount of insulation from competitive winds. For one thing, they go to Europe or Japan where computer sales -- particularly, minicomputer shipments -- have held up much better than in the U.S. Interdata, for example, attributes a recent upswing in orders to its international activity. Shipments of dedicated application machines to international customers make up almost a fifth of all such shipments by U.S.-based companies.

Price-cutting is another reaction. DEC sees the current situation as a good time to lower prices and gain in market share, on the theory that smaller manufacturers are less able to price below the profitable level when money for financing is tight. DEC is also moving toward supplying total hardware systems rather than just the computer component . . . slowly, because it is wary of competing with its own OEM customers. (Companies such as Hewlett-Packard, Varian, Raytheon and Lockheed already sell total measurement and control systems.)

Mini makers have been hit by the economic downswing, but taken as a group, not as heavily as the major computer manufacturers. This is still a young field, and sales are "lagging" only when compared to expectations. With IBM's endorsement of the spectacular potential of the minicomputer market -- and with its expected heavy customer education -- the rubber band appears posed for an even longer flight.

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DEDICATED APPLICATION DIGITAL COMPUTER CENSUS

The data listed below for Dedicated Application General Purpose Computers (Group B) is based on the best information available to the International Data Corporation, and much of it has been verified by the manufacturers. Comments or corrections should be directed to EDP/IR's census editor.

Group B computers, for the purposes of this Census, are defined as those commonly called minicomputers as well as certain larger systems usually designed or used for one dedicated application such as process control, data acquisition, or the like. These computers are word oriented, usually purchased, and predominately programmed in assembly language. They have been grouped as follows:

Class	Average System Purchase Price	No. of Models Currently Marketed
1	$ 1 - $24,999	78
2	$ 25,000 - $49,999	27
3	$ 50,000 - $99,999	22
4	$100,000 - Above	23

Of the 71 companies in this Census, 11 do not actually manufacture computers; rather, they buy processors from an Original Equipment Manufacturer and market them as shown. These firms are identified with an asterisk (*).

AS OF JULY 1, 1970

NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) SYS. BASIC	PURCHASE PRICE ($1,000) SYS. AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
* Astrodata	ADAC	a	12	1	4.0	8.5	8/70	3	0	3	3
Atron	501		8	1	7.5	35	9/69	65	0	65	N/A
Autonetics	Recomp-II		40	4	95	127	11/58	20	5	25	X
	Recomp-III		40	3	65	94	6/61	7	2	9	X
Bailey Meter	755		25	4	80	200	11/61	6	0	6	X
	756		25	4	90	200	2/65	14	6	20	8
	855/25		25	4	100	300	12/68	8	0	8	12
* Beckman Instruments	82		12	3	32.3	62.3	8/67	32	8	40	6
* Business Information Technology	480		8	1	6	6.9	12/66	180	0	180	N/A
	483		8	1	7.7	10	1/70	60	8	68	150
Cascade Data Computer	80/20		8	3	26	26	6/70	1	0	1	1
	80/30		8	2	28	28	1/70	10	0	10	6
* Cincinnati Milacron	CIP-2000		8/9	1	3.1	5	12/69	N/A	0	N/A	237
	CIP-2100		8/9	1	5.5	8	7/69	N/A	0	N/A	
* Clary Datacomp	404		16	1	6.6	25	10/69	20	10	30	350
Collins Radio	8400			4		950	11/62	25	5	30	X
	8500		32	4		150	1/67	49	13	62	N/A
Comcet	10			1		17	6/69	6	0	6	N/A
	20		8	3		80	N/A	0	0	0	75
	40		8	4		162	6/69	4	0	4	N/A
	60		8	4		212	6/69	6	0	6	
Compiler Systems, Inc.	CSI-16		16	2	10.7	50	11/70	-	-	-	10
	CSI-24		24	3	14.9	75	11/70	-	-	-	30
Computer Automation Inc.	208		8	1	5.9	10.5	6/69	155	10	165	85
	808		8	1	4.9	10	6/68				
	216		16	1	7.9	9.9	9/69	130	15	145	260
	816		16	1	9.9	11.9	12/68				
* Computer Logic	CLS-18		18	1	9.8	14.4	3/70	1	-	1	N/A
Computer Signal Processor	CSP-30		8/16	3	85	100	6/70	2	0	2	5
Control Data Corp.	160		12	4	60	112	5/60	49	11	60	X
	160-A		12	4	90	225	7/61	200	65	265	X
	160-G		13	4		535	3/64	35	0	35	X
	924/A		24	4		430	8/61	26	1	27	X
	1700		16	4	43	170	5/66	265	67	332	40
	8090		12	3		96	5/64	116	89	205	X
	8092		8	3		67	6/64	60	0	60	X
	G-15		29	3		61	7/55	265	18	283	X
	LGP-21		32	2	49.5	42	12/62	140	13	153	X
	LGP-30		32	3	87.5	59	9/56	290	48	338	X
	RPC-4000		32	4		101	10/60	61	12	73	X
	CSC-46		21	4		250	/54	10	0	10	X
	CSC-136		25	4		275	/60	4	1	5	X
	CSC-636		15	4		300	10/63	13	2	15	X

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Datacraft	6024-1		24	4	51.4	160	5/69	8	0	8	5
	6024-3		24	3	32.8	56	2/70	11	0	11	67
Data General Corp.	Nova		16	1	7.9	15	2/69	N/A	N/A	500	N/A
	Super Nova		16	1	9.6	10	4/70	N/A	N/A	22	N/A
Datamate Computer Systems	DM-1¢		16	2	14.9	26	10/69	10	0	10	2
	DM-70		16	1	8.5	15	8/70	3	-	3	9
	DM-70ROM		16	1	3.7	5.9	8/70	-	-	-	N/A
	ECP-18		18	1	13.9	15.1	11/66	21	0	21	X
*Data Processing International	DPI-500	a	12	3	50	70	7/69	12	0	12	25
Digiac	3080		25	2	25	29.8	12/64	7	0	7	X
	3080-C		25	2	25.8	29.8	12/64	8	0	8	3
Digital Computer Controls	D-112		12	1	3.9	10	7/70	5	5	10	300
Digital Equipment Corp.	PDP-1		18	4	120	136	11/60	50	2	52	X
	PDP-4		18	3		74	8/62	40	5	45	X
	PDP-5		12	2	30	36	9/63	90	10	100	X
	PDP-7		18	3		66	11/64	124	36	160	X
	PDP-8		12	1	18.5	24	5/65	1192	258	1450	X
	PDP-8E		12	1	3.2		4/71	-	-	-	N/A
	PDP-8/I		12	2	13.4	25	3/68	2042	600	2642	N/A
	PDP-8/L		12	1	8.5	20	7/68	2440	380	2820	N/A
	PDP-8/S		12	1	10	18	9/66	768	150	918	X
	PDP-9		18	3	35	62	12/66	300	132	432	N/A
	PDP-9/L		18	2	19.9	32.6	11/68	35	12	47	N/A
	PDP-11		16	1	7.7	15	4/70	116	28	144	500
	PDP-12		12	2	27.9	35	4/69	285	75	360	N/A
	PDP-15		18	3	16.5	55	2/70	100	25	125	N/A
	Linc-8		12	2	38.5	47.5	9/66	102	40	142	X
Digital Scientific	META-4		16	3	8.7	100	4/70	12	0	12	250
Dynamic Research	DRC-44		24	3	39	51.1	12/69	4	0	4	1
EMR Computer	210		21	4	94	132	4/62	9	0	9	X
	420		42	4	324	450	6/63	3	0	3	X
	2100		21	4	65	143	12/63	8	0	8	X
	6020		24	4	71.5	176	4/65	15	2	17	X
	6040		24	4	97.5	224	7/65	10	1	11	X
	6050		24	4	122.5	360	2/66	19	6	25	X
	6070		24	4	239.5	600	10/65	1	2	3	X
	6135		16	3	39	62	10/67	40	0	40	10
	6155		16	4	85	125	11/69	2	0	2	1
Elbit Computer, Ltd.	100		12	1	6.4		1/68	0	200	200	
Electronic Associates, Inc.	640		16	3	24.5	50	6/67	100	25	125	6
	8400		32	4	-	260	6/65	24	4	28	0
	1020		16	2	25		2/64	100	27	127	X
*Electronic Engineering Co. of California	EECO-1600	b	16	3	8	80	5/70	1	1	2	0
Foto-Mem, Inc.	Centauer-100		8/16	1	6.2		4/70	11	0	11	90
GRI Computer Corp.	909		16	1	5	10	1/70	29	3	32	200
General Automation, Inc.	SPC-12		12	1	5	18	2/69	500	250	750	200
	SPC-16		16	2	10	25	4/70	43	7	50	15
	GA-18/30		16	3	18	50	7/69	90	10	100	25
General Electric Co., GE/PAC	30		16	2	13	35	4/69	44	1	45	40
	312		20	4		200	3/60	27	6	33	X
	412		20	4		300	7/62	39	8	47	X
	3010		16	4		160	N/A	N/A	N/A	N/A	N/A
	4010		24	4	78	200	N/A	N/A	N/A	N/A	N/A
	4020		24	4	110	240	2/67	155	45	200	60
	4040		24	4		120	8/64	45	20	65	X
	4050		24	4		280	12/66	23	1	24	X
	4060		24	4		340	6/65	18	2	20	X
Hetra Corp.	HUT-A		16	2	5.4	30	9/70	-	-	-	7
	HUT-B		16	2	5.4	46	1/71	-	-	-	3
	HUT-C		16	3	5.4	50	N/A	-	-	-	0
*Hewlett-Packard Co.	2000-A	i	16	3	90.5	100.5	11/68	130	56	186	18
	2005-A	h	16	3	71.6	85	6/69	20	0	20	5
	2007-A	g	16	1	19.9	19.9	9/68	35	9	44	8
	2000-B	f	16	4	124	134	8/70	-	-	-	7
	2114-A		16	1	10.4	16	10/68	409	109	518	78
	2114-B		16	1	8.5	15	11/69	166	69	235	95
	2115-A		16	2	14.5	26	11/67	267	45	312	5
	2116-A		16	2	22	32	11/66	85	15	100	X
	2116-B		16	2	24	40	9/68	522	128	650	76
Honeywell, CCD	116		16	3		65	4/68	172	32	204	N/A
	316		16	2	9.7	28	6/69	365	56	421	N/A
	416		16	2	15.7	43	9/68	199	131	330	N/A
	516		16	3	23.8	55	6/66	586	174	760	N/A
	19		19	4		140	5/61	3	0	3	X
	24		24	4		200	5/63	82	3	85	X
	124		24	3		80	3/66	106	18	124	X
	224		24	4		380	3/65	55	8	63	X
	240		18	4		175	11/60	10	2	12	X
	610/620	d	24	4		180	9/63	22	6	28	X
	H-21		20	3		63	2/66	41	25	66	X
	632		32	4		240	12/68	8	4	12	6
	1648	j	16	4		440	6/68	13	3	16	12
	324		24	4		400	7/68	6	0	6	X
	290		18	4		175	11/60	10	2	12	X
IBM	1800		18	4		235	2/66	820	275	1095	N/A
Imlac	PDS-1		16	1	9.6	11	2/70	N/A	0	N/A	N/A
*Information Instruments	PDQ-II	c	8	3	6	72	4/70	15	0	15	15
Information Technology	4900/10		16	1	9.9	20	10/65	25	0	25	25
	4900/5		8	1	2.5	5	10/70	-	-	-	N/A
	4900/20		16/32	3	30	50	10/69	6	0	6	N/A
Interdata, Inc.	1		8	1	4.6		N/A	-	-	-	24
	2		8	1	8.9	11	7/68	N/A		18	0
	3		16	1	8.9	20	5/67	N/A		230	40
	4		16	2	10.9	28	8/68	N/A		175	95
	5		16	2	12.9		N/A	-	-	-	N/A
	15		16	2	17.3	40	1/69	N/A		60	10
Interplex	System I		16	2	46.8	46.8	9/70	-	-	-	2

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AS OF JULY 1, 1970

NAME OF MANUFACTURER	COMPUTER MODEL	NOTES	BITS PER WORD	PRICE CLASS	PURCHASE PRICE ($1,000) SYS. BASIC	PURCHASE PRICE ($1,000) SYS. AVERAGE	DATE OF FIRST INSTALLATION	NUMBER OF INSTALLATIONS IN U.S.	NUMBER OF INSTALLATIONS OUTSIDE U.S.	TOTAL NUMBER OF INSTALLATIONS	TOTAL NUMBER UNFILLED ORDERS
Lockheed Electronics	MAC-16		16	1	11.2	21.6	3/69	200	6	206	300
	MAC-Jr		16	1	7.9		9/70	-	-	-	45
Micro Systems Technology	800		16	1	2.5	6.9	1/69	120	23	143	190
	810		8	1	6.4	8.3	1/69	90	2	92	125
	812		8	1	10.9	15	12/69	10	0	10	195
*Mini Comp	Administrator-2		16	3	35	52	12/70	-	-	-	2
	Multi User-I		16	3	40	58	1/71	-	-	-	2
	Multi User-E		16	3	67	85	11/70	-	-	-	4
Monitor Data Corp.	MD-708		8	1	3.2	3.7	8/70	-	-	-	119
Motorola Instrumentation & Control	MDP-1000		8	1	6.9	18.9	6/68	40	0	40	N/A
Multidata Inc.	Model-A		16	2	15	40	6/70	3	0	3	17
Northwest Data Systems	803		16				8/69	3	0	3	N/A
	804		16				8/69	-	0	-	1
	903		16				N/A	-	0	-	N/A
	904		16				N/A	-	0	-	N/A
Omnicomp Computer Corp.	Omnus-1		16	1	7	12	2/71	-	0	-	N/A
Qantel Corp.	Qantel-V		8	1	13.9	16	4/70	16	0	16	N/A
Raytheon Computer	703		16	1	12.7	20	10/67	161	20	181	1
	704		16	1	9.7		3/70	12	6	18	12
	706		16	2	19	36	5/69	40	4	44	10
	PB-250		22	2	33	48	12/60	155	20	175	N/A
	PB-440		24	4		140	3/64	18	2	20	N/A
	PB-520		24	4		128	10/65	26	1	27	N/A
Redcor Corp.	RC-70		16	1	22.5	22.5	7/68	85	0	85	70
	RC-77		16	4	100	111	1/70	N/A	0	N/A	N/A
Rolm Corp.	1601		16	2	20	28	2/70	15	0	15	N/A
Sanders	SANDAC-200		16	3	30	72	3/69	6	0	6	N/A
Scientific Control	660		24	3	31	80	10/65	230	0	230	N/A
	4700		16	3	22.5	50	4/69	16	0	16	11
	DCT-132		8	2	27.9	29.5	5/69	40	14	54	14
Spear	Microlinc		12	3	46	56.5	6/66	31	3	34	3
Spiras Systems	65		16	1	9.8	20	9/69	20	0	20	N/A
Systems Engineering Labs	810		16	2	37.5	45	9/65	24	0	24	X
	810-A		16	3	18	90	8/66	158	4	162	N/A
	810-B		16	4	33.5	150	12/68	59	0	59	N/A
	840		24	3	65	80	11/65	3	0	3	X
	840-A		24	3	60	75	8/66	36	2	38	X
	840-MP		24	4	50	250	10/67	N/A	0	N/A	N/A
	86		32	4	200	325	6/70	-	-	-	N/A
	88		32	4	350	600	3/71	-	-	-	N/A
Tempo Computers	1		16/18	1	13.8	15.6	9/69	20	0	20	N/A
Texas Instruments	960		1-16	2	14.5	30	5/70	1	0	1	3
	980		16	2	16.7	40	8/70	-	-	-	3
Transistor Electronics	TEC-520		16	1	9.9	14.5	9/69	6	0	6	N/A
Unicom, Inc.	CP-8A		8	1	1.8	1.9	2/70	20	1	21	50
	CP-8B		8	1	2.1	2.4	3/70	12	0	12	40
	CP-8C		8	1	3.7	4.5	3/70	18	2	20	75
	CP-8D		8	1	5.4	5.4	4/70	5	0	5	7
Unicomp, Inc.	Comp-16		16	1	9.8	26.5	6/70	7	0	7	7
	Comp-18		18	2	10.5	38	8/70	8	0	8	8
Varian	520i		8	1	6	12.8	9/68	85	0	85	50
	610		12	1		14.7	7/64	10	0	10	X
	620		16	2		37	11/65	75	0	75	X
	620i		16/18	1	9.9	20	7/67	1220	50	1270	450
	620f		16	1	10.5		9/70	-	-	-	100
	R620i		16/18	1	16.9	25	5/69	45	14	59	230
	R622i		18	1	12	20	10/67	65	12	77	60
Varisystems Corp.	PAC-16	k	16	1	3.8		11/69	125	1	126	60
Viatron	2140		16	1	4.8		8/71	-	-	-	N/A
	2150		16	1	9.6	16.2	6/71	-	-	-	N/A
Victor mptometer	820/03		64	1	10.7	12	4/69	25	1500	1525	200
	820/10		64	1	9	10	4/69	100	5500	5600	200
	820/21		64	2	16.5	25.3	4/69	25	2500	2525	50
	820/25		64	2	24	26.6	4/69	170	2000	2170	75
	820/30		64	2	27	29.9	4/69	50	1000	1050	25
Wang Labs, Inc.	3300		8	1	4.9	14	9/70	-	-	-	20
Westinghouse Electric Corp. Prodac	50		14	1	15.5	23.3	8/64	165	20	185	80
	250	e	16	3	40	62	9/67	100	10	110	50
	510/580		18	4	-	110	6/63	110	20	130	X
	2000		16	2	10	26.6	8/69	47	20	67	120
Xerox Data Systems	CE-16		16	1	7.9	12.6	6/69	N/A	N/A	N/A	N/A
	CF-16		16	1	14.9	25	9/69	N/A	N/A	N/A	N/A
	Sigma-2		16	3		84	12/66	191	52	243	80
	Sigma-3		16	4	30	104	12/69	2	0	2	N/A
	92		12	3		60	4/65	60	5	65	X
	910		24	3		80	8/62	168	15	183	X
	920		24	4		116	9/62	135	19	154	X
	925		24	4		120	12/64	20	2	22	X
	930		24	4		136	6/64	140	19	159	X

* CPU purchased OEM and marketed by company listed.

a Version of DEC - PDP-8/L
b Version of Data General - NOVA
c Version of Varian - 620/i
d Version of SDS - 910/920
e Version of XDS - Sigma-2
f Utilizes: Hewlett-Packard 2114B and 2116B
g Utilizes: Hewlett-Packard 2114A or B (called Educational Basic System)
h Utilizes: Hewlett-Packard 2116B (called Real Time Executive System)
i Utilizes: Hewlett-Packard 2116B
j Utilizes: Honeywell 316 (quantity of 2 per system)
k Manufactured by: Photon, Inc.

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October 12, - October 30, 1970

	1970 High	1970 Low	3 week Sales in 100's	3 week High	3 week Low	Last	3 week Net Change	3 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	21	4119	30 3/4	26	26 7/8	- 3 5/8	-12
American R & D	99 1/2	37 1/8	4361	65	50	50	-12 1/4	-20
Ampex Corp.	48 1/2	12 1/2	3424	19 1/4	15 3/4	17 3/8	- 1 1/4	- 7
Bunker Ramo	14 1/2	6 1/8	1577	10 3/8	8 3/4	8 7/8	- 5/8	- 7
Burroughs	172 3/4	78 5/8	4468	120 1/8	110 1/4	113 3/8	- 4 1/8	- 4
Collins Radio	37 1/4	9	681	17	14 1/2	14 5/8	- 2 1/8	-13
Computer Sciences	34 1/8	5 3/8	5205	12 3/8	10	11 3/8	- 1/2	- 4
Control Data	122 1/2	28 3/4	5502	49	43	45 3/4	- 2 5/8	- 5
Data Proc. Fin. & Gen.	32	6 5/8	2291	15	11 7/8	12 1/2	- 2 3/8	-16
Electronic Assoc.	11 5/8	3 5/8	435	5 7/8	4 1/8	4 1/2	- 1 1/2	-25
General Electric	87 3/8	60 1/4	4719	87 3/8	82 1/2	86	+ 1 5/8	+ 2
Honeywell	152	65 5/8	3877	85 3/4	75 3/8	75 3/4	- 9 7/8	-12
IBM	387	218 3/4	3964	300	283	294	- 2 1/8	- 1
ITT	60 1/8	30 1/2	5011	46	42 3/8	42 5/8	- 2 1/4	- 5
Leasco	30 1/2	7	3825	14 5/8	11 7/8	12 1/8	- 1 7/8	-13
Litton	38	15 1/4	4742	25 3/8	21 7/8	23 5/8	- 1/2	- 2
Memorex	166 3/4	44 1/2	7060	87	75 5/8	81 1/4	- 1 3/4	- 2
Mohawk Data Sciences	87	18 1/8	4012	35 1/2	28 7/8	30 5/8	- 4 3/4	-13
National Cash Register	63	29 1/4	5237	43	35 1/8	35 3/8	- 6 1/8	-15
Planning Research	53 1/4	13 5/8	1512	23 7/8	18 3/8	19	- 3	-14
RCA	34 5/8	18 1/8	4492	25 3/4	22 5/8	23 1/4	- 2 5/8	-10
Raytheon	33 5/8	16 1/8	1447	23 1/2	19 3/4	21 1/4	- 2	- 9
SCM	24 3/4	11 1/8	1526	16 1/8	13 1/4	13 3/4	- 2 1/2	-15
Sanders	29 7/8	7 1/8	983	15 1/4	12	12 1/8	- 3 5/8	-23
Sangamo	29 1/8	9 1/8	575	17 1/4	14	14 3/8	- 1 1/2	- 9
Singer	85 3/4	53 1/4	930	68 7/8	62 1/2	64 3/8	- 4	- 6
Sperry Rand	40 3/8	18 3/4	6197	27 1/8	23	23 1/8	- 3 3/8	-13
Teledyne	40	13	3980	21 1/8	19	19 5/8	- 1 3/8	- 7
Telex	25 7/8	9 1/8	23,148	23 1/2	19 3/8	22 7/8	+ 2 1/8	+10
University Computing	99 3/8	13 1/4	14,607	33 1/4	19 1/8	21 3/8	-10	-32
Western Union	48 1/4	31	2252	36 7/8	34 1/4	35	- 1 3/8	- 4
Xerox	115 3/4	65 1/4	7086	88	84 1/8	86 1/2	+ 1/2	+ 1
NYSE COMPUTER STOCK AVERAGE							- 2.9	- 9.5
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	3 3/4	147	7 1/4	6 1/8	6 1/8	- 1 1/8	-16
Automatic D P	47 3/4	23 1/2	1241	42 1/8	38 1/4	41 3/8	+ 1 3/4	+ 4
Bolt, Beranek & Newman, Inc.	8 3/4	6 3/4	124*	11 1/4	5 1/2	7 1/4	- 1 1/4	-15
CalComp	33 7/8	10 1/4	7153	33 1/8	25	32	+ 6	+23
Clary Corp.	10 1/2	3 3/8	113	4 7/8	4 1/8	4 3/8	- 1/2	-10
Computer Applications	--	--	--	--	--	--	--	--
Computing and Software	75 3/4	16 1/4	1370	34	29 7/8	30 1/8	- 1	- 3
DPA, Inc.	10 3/8	3 3/8	235	5 5/8	4 1/2	4 3/4	- 5/8	-12
Data Products	25 1/2	4 3/4	2351	8 7/8	6	6 5/8	- 1 5/8	-20
Digital Equipment	124	48 3/4	6796	77 7/8	57 1/2	57 1/2	-19 1/2	-25
Granite Mgt.	22 1/4	7 3/8	253	12 3/4	9 5/8	10 5/8	- 2	-16
Greyhound Computer	14 1/8	5	156	8 1/2	6 1/2	6 7/8	- 1 5/8	-19
ITEL	25 1/2	6 1/8	3302	17 1/2	13 5/8	16	+ 2 1/2	+19
Levin-Townsend Comp.	19 3/8	3	557	6 3/4	5 1/2	5 5/8	- 1/2	- 8
Milgo Elect.	40 1/2	15	6390	35 7/8	30 1/2	32 1/4	- 3 7/8	-11
Potter Instrument	42 3/4	14 5/8	929	23 3/8	19 1/2	20 3/8	- 1 5/8	- 7
Sys. Eng. Labs	49 1/8	10 1/8	4841	20 3/4	17 1/4	17 1/2	- 1 3/4	- 9
AMSE COMPUTER STOCK AVERAGE							- 1.7	- 7.8

* 2 weeks

	1970 High Bid	1970 Low Bid	October 30, Bid	October 30, Asked	3 weeks ago Bid	3 week net change Bid	3 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	8	1 1/4	2 1/8	2 5/8	2 5/8	- 1/2	-19
Computer Usage	8 1/2	2	3 5/8	4	4 1/4	- 5/8	-15
DASA Corp.	44	3 3/4	5 1/4	5 1/2	6 5/8	- 1 3/8	-21
Digitronics	13 3/4	4 1/4	4 1/4	4 3/4	5	- 3/4	-15
Fabri-Tek	8 1/2	2 7/8	3	3 3/8	3 7/8	- 7/8	-23
Informatics, Inc.	20 1/2	4 1/4	6 1/4	6 3/4	8 3/4	- 2 1/2	-29
LMC Data, Inc.	3 5/8	1 1/4	1 1/2	2	1 5/8	- 1/8	- 8
Management Assistance	4	1 1/8	1 1/8	1 3/8	1 5/8	- 1/2	-31
Optical Scanning Corp.	52	11	15 1/2	17	19 1/2	- 4	-21
Recognition Equipment Inc.	83 1/2	12 1/3	16	16 1/2	19	- 3	-16
TBS Computer Centers Corp.	27	4	4 1/2	6	5	- 1/2	-10
Tally Corp.	23	9 1/2	15 1/2	16 1/2	15 1/2	--	--

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E|D|P industry report

• THE INTERNATIONAL DATA CORPORATION'S NEWSLETTER FOR EXECUTIVES CONCERNED WITH THE ELECTRONIC DATA PROCESSING INDUSTRY

"THE GRAY SHEET" DECEMBER 9,1970 • VOL.5,NO.24 P.J.McGOVERN,EDITOR

Super-buyer strikes again

LARGE PROCUREMENTS DRAMATIZE SHIFT IN GOVERNMENT'S ATTITUDE TOWARD INDEPENDENT PERIPHERAL SUPPLIERS

Before long -- if no conflicts come along to cause further delay -- the Internal Revenue Service is expected to award a contract for the biggest order of CRTs in the history of the EDP industry, and independent peripheral makers are getting a crack at it right along with the mainframe bidders. More terminal "buys" may follow next year. At the same time, the Federal Government is pondering many millions worth of IBM-compatible disk and tape drive procurements put out for bids earlier this year. In short, Uncle Sam is finally doing what he's talked about for years.

But still, the independent peripheral manufacturers are protesting acquisition policies through the Computer Peripherals Manufacturers Association (CPMA), formed a year ago at the 1969 Fall Joint.

The Federal Government is a huge user of computers -- its annual expenditure on EDP of over $2 billion pays for nearly 5,000 computers, the biggest inventory of any organization in the world. In this issue, we examine what the Government's current buying spree may mean to the independents over the long haul. But first, a rundown on recent and current peripherals procurements.

- The IRS project involves about 3600 CRTs and ten large-scale computers to equip regional IRS centers for retrieval of information from taxpayer files. Estimates put the terminals portion of the contract at $20 million or so. To quote one CRT manufacturer, that piece of business would be "very, very, very . . . very significant" to his company. This is the first time peripherals have been broken out for separate bidding in a large Government buy. The mainframe makers are bidding on the total contract, and Bunker Ramo, Foto-Mem, Infoton, Raytheon, Sanders, and Sylvania's Ultronics Division are all said to be bidding on the terminals portion.

- The "government-wide peripherals procurement" of 594 tape and disk drives is another prize up for grabs. The General Services Administration has consolidated needs of several agencies into one large buy that will result in a cost reduction of over $11 million.

- Last month the Veterans Administration handed a contract worth $3.5 million to Calcomp to replace 24 IBM 2311 disks between now and April, 1971, in several metropolitan areas. Another award due soon will be by the Defense Supply Agency for 172 disk and tape drives.

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- In a Navy award earlier this year, Potter Instrument netted the biggest contract for delivery of IBM compatibles -- $5.8M. Other contracts went to Calcomp ($4.4M), Memorex ($3.6M), Ampex ($1.3M), and Telex ($600K). These units will be on three-year lease, with deliveries to continue into 1971 (EDP/IR Aug.17, 1970).

In the Navy procurement, Potter's orders will be scattered among disk and tape systems of various vintages. In the Navy buy as in the VA procurement, Calcomp will deliver 2311- and 2314-type disk systems only, while Memorex's entire contract is for 2314-compatibles. The significance of these awards is somewhat ambiguous. Telex, for example, is one of the front-runners in shipping IBM-compatible disk drives to private users, but it won none of the Navy disk awards. Two other companies -- Control Data and Ampex -- announced IBM-compatible disks too late to get in on current bidding, but they could be contenders in future buys.

To the chagrin of some independents, peripherals have not been broken out for separate bidding in the Defense Department's World Wide Military Command and Control System ("Wimmix"). RFPs on this 35-computer project (including both initial and optional systems) finally emerged October 1 after many delays, reviews, and cuts in the size of the acquisition. A March contract award is likely.

The Government market for peripherals

Replacement of hundreds of IBM tape and disk units makes cheery reading for the independents, but the current procurements are the last of the big actions in that area. From now on, independent tape and disk drive suppliers will find their market in whatever IBM-replacement business is left and, with luck, in the annual crop of new computer systems and new disk and tape add-ons.

If the independents successfully bid on the remaining procurements, three-fourths of the number of rented disk and tape units on IBM computers used by the Government will be independently supplied.

The Government is also in the market for other kinds of peripherals. Companies manufacturing terminals and various off-line devices such as key-entry and OCR systems have the best chance of making headway. Other on-line equipment, except for IBM plug-to-plug compatibles, will be as difficult to sell to the Government as it is to private users, at least for the next year or so.

For the most part, this gigantic user is not far ahead of -- and often behind -- other major users in its movement from one type of equipment to another. One area where it may pull ahead of private users is in the marriage of non-plug-compatible peripherals supplied by independents to both IBM and non-IBM systems. As a big customer for non-IBM computers, the Government has a particular interest in at least experimenting with this concept. Most independents don't bother marketing devices which are plug-compatible with the Seven Dwarfs' machines. And, of course, the Government can better justify the fixed cost of exploring this concept. Later in the issue we discuss the Government's specific activities.

The use of non-plug-compatible peripherals has come up at meetings of Federal and private computer customers. It was brought up a number of times at hearings on EDP procurement held before the Subcommittee on Economy in Government, chaired by Senator Proxmire last summer. All the talk does not guarantee results, however. In Washington there is often a yawning disparity between talk and action.

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IBM's position

IBM has supplied only 40% of the Federal Government's computers, compared to 67% of total U.S. computer installations. It receives about $9 million a month rental from the Government, but it stands to lose roughly $2 million of this to the independents. At least that is the picture for the immediate future.

Eventually -- when budgets allow -- the agencies will want to replace their computer systems with System/370 models. Perhaps they will replace the tape drive portion sooner, with IBM's new 3420. When that time comes, Potter, Calcomp, Memorex and the rest will be thrown into competition with IBM's new peripherals -- the 2319 and 3330 disk systems as well as the 3420 tape drive. And the price competition may be rougher than before (EDP/IR Nov. 6 and Aug. 17, 1970).

The following table shows what general application systems the Government is renting from IBM. (It does not include contractor-leased computers, although the GSA does have procurement authority over some of these.) The number installed of each model is taken from the Government's most recent published inventory. That census shows IBM to have 28% of its computers by number, but by value this share would be somewhat higher. About half of the Government's IBM computers are owned.

IBM SYSTEMS ON RENT TO THE FEDERAL GOVERNMENT
(As of June 30, 1970)

System/360	Number Installed	Mo. Rental ($1000)	Other Models	Number Installed	Mo. Rental ($1000)
20	93	$ 298	1130	66	$ 112
25	8	60	1401,G,H	62	329
30	88	924	1410	22	374
40 & 44	63	1194	1460	21	206
50	61	2013	7010	14	364
65	37	2331	7044	4	146
85	1	155	Others	42	371
Totals	351	$6975	Totals	231	$1902

IBM does not give the Government special discounts on rentals. It has, however, increased the rental credit offered through the Federal Supply Schedule from two to two-and-a-half years. (Private users get a one year maximum credit of rental payments toward purchase price.) There is a dollar limit of $5 million per year on the extra six months credit, but it doesn't seem to be a very stringent limit. The Government could buy nearly all the 360/30s it rents without exceeding it.

One other provision in IBM's FSS contract involves 170 second-generation peripherals. In effect, if the Government keeps certain tape, printer and other units on rent until June 1, 1971, it takes title in return for the last month's rent.

If these purchase discounts do in fact cause the agencies to buy installed equipment, a replacement market for independent peripherals could be closed off. (The agencies can convert from rental to purchase without calling for competitive bids.) However, most of the IBM disk and tape drives which haven't yet come up for replacement probably will not be candidates in the future. The agencies using them don't want independent equipment for various reasons, such as security precautions -- which may make extra maintenance forces undesirable -- or because the whole system is scheduled to be replaced soon anyway.

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Dealing with Uncle Sam

In many ways, the various agencies act like so many independent buyers. Except in the case of plug-compatible disk and tape drives, they must be sold on the idea of using independent peripherals, just as private users must. Even so, some of these buyers -- particularly the military agencies -- are shopping for very large amounts of computer hardware. And when the General Services Administration acts as central buying agent, some walloping big contracts come up for grabs.

The GSA has definitely swung into action as the bargaining arm for the agencies in some EDP buys. Before, it had negotiated open-ended Federal Supply Schedule contracts which set terms of some dealings with the Government, but did not guarantee any business to the computer companies. Now, the GSA is making specific giant-size procurements. With this buying power, it can not only pinch pennies for the Government, but also affect the profits of both smaller and larger independents.

Each year the GSA negotiates FSS contracts with many of the Government's suppliers. These contracts can apply to small acquisitions and to purchase or continued rental of installed systems. Agencies are supposed to pick the least-cost supplier when they convert their systems from lease to purchase, but they don't have to publicly ask for proposals from the various competitors. Thus, FSS contracts are important in decisions to buy installed computers, but they are much less significant in new acquisitions -- any buy of over $400K must go out for bids.

Even when initial acquisition isn't centralized, Government users are still subject to the influence of the GSA, Office of Management and Budget (the old Budget Bureau), the General Accounting Office and, ultimately, Congress. By arguing their case before GSA, Congress, or even the courts, the independents as a group may smooth the way to more business from the agencies.

The CPMA is trying to do just that. It has over 40 member companies, including such major independents as Potter, Memorex, and Bryant, as well as smaller peripherals firms. In a campaign for better treatment of independents, the association has made statements complaining about FSS negotiations, the Wimmix procurement and computer interfaces.

Preview of coming events

The following comments indicate how far along the Government is toward mix-and-matching of non plug-compatible peripherals with various computer models.

Breakout of peripherals for separate bidding when a system is first procured, as opposed to replacement later on of some of its components by lower-priced substitutes, is important to the independents. It lets them in on lease revenues at the beginning of the system's life. And for purchased systems, they have little chance at all of replacing disk or tape units after the original units are installed. But as a general policy, breakout of peripherals during initial bidding appears to be several years away . . . if it ever comes. (Although as was mentioned earlier, the IRS did break out the terminals portion of its project.) A critical test of the separate procurement concept should be completed sometime during next fall; the GSA will size up performance of a mixed system made up of an IBM 360/30 processor and independently supplied peripherals.

A standard interface would let the Government freely mix peripherals and processors from various manufacturers. But getting anyone to agree on a standard

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within the next few years (if ever) is extremely unlikely. The next best solution is to develop a universal adapter that would either be programmed to interface different system devices or would have plug-in circuit cards to do the same thing. This kind of controller is possible, but it poses a tough technical problem. Currently the National Bureau of Standards is working out specs for such a device, but it will take competitive bidding by potential builders of the adapter to see whether it is economically feasible.

Finally, at House hearings slated for early next session, Congress and witnesses are likely to lambast the GSA for not fully utilizing its authority over computer procurement. If this agency takes the cue, it could very well lead to more business for the independents.

Prognosis

Peripherals makers have griped for years about their poor-relation treatment by the Government. Congress has been concerned for years. In 1965 it passed a bill to revamp Government purchase and use patterns for EDP, but so far only part of its aims have been accomplished. The Vietnam war has greased the wheels toward buying from independents through its pressure on Government budgets. As long as money is short, Federal users (like private users) will veer toward the lower-priced independent equipment, at least in areas where this requires no particular innovation.

A big hunk of business from the Government (or anyone else) can have good effects on the winner. It not only brings in revenue and spreads general overhead, but it also may help justify specific service centers and create automatic advertising for the peripheral "brand name." On the other hand, when the Government's installations are off the beaten track, the independent may find himself arranging for service in locations where there is not much private business to be had.

The Government market for independent peripherals is a moderate chunk of overall demand, but within it buying power is concentrated and decisions are becoming more centrally influenced. This sector using about 10% of the computers in the U.S., by value, is potentially a rich lode for the independents to mine.

IBM CHARGES MEMOREX WITH TRADE SECRET VIOLATIONS

Last week IBM filed a lawsuit against one of its most active disk file competitors, Memorex Corp. IBM accused Memorex of "wrongful appropriation and use of IBM trade secrets and confidential information." The industry giant didn't ask for damages . . . just an injunction against more use of trade secrets and against hiring IBM employees in order to obtain confidential information. Also, IBM wants back any confidential documents that Memorex may have.

One of IBM's aims appears to be to discourage migration of the key technology supporting the design of its 370 line during this pre-delivery period. Much depends on the ability of the independents to quickly follow IBM deliveries with their own plug-compatible units. If they are on time with these, IBM stands to lose larger and larger shares of its peripherals business to the independents.

This suit, and possibly future ones like it, will make IBM employees think twice about joining the competition or perhaps starting new companies to make equipment closely competitive with IBM's. While currently marketed products probably won't be affected, future models may.

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Memorex's reply

The day after IBM's filing, Memorex came back with a strongly worded statement which cited its own success in replacing IBM equipment and charged:

> IBM's objective clearly is to quash this competition [in disk system and other peripherals areas] before it succeeds more, and we assume that its legal action is a part of its strategy to do so.

Memorex hinted that it may go to the Justice Department for help in fighting the suit. (The Department's Antitrust Division, of course, has been conducting a case against IBM since the beginning of 1969. Proceedings are still in the preliminary discovery stage.) Elsewhere in its reply, Memorex says that "at the appropriate time, [it will] also disclose evidence of IBM's false representations to its customers regarding Memorex's equipment in violation of the anti-trust laws."

Where have all the ex-IBMers gone?

A good part of the computer industry is made up of ex-IBM people who started their own companies. As the employer of over 50% of the people working for computer makers, IBM has been the prime training ground for computer designers, engineers, sales and support people . . . and marketing management. The profile of personnel at independent disk and tape drive makers offers no exception.

Memorex says in its reply that it has "former IBM employees in important management posts who are now competing with their former employer." IBM's nearby San Jose operation -- which produces its disk systems -- has been the source of key people to ISS (the OEM supplier of Telex's disk files) and Iomec (maker of disks for minis) as well as to Memorex. Ironically, another maker of 2314-compatible disks -- Century Data Systems -- is stocked with people from Memorex.

Meanwhile, IBM's tape drive operation in Boulder, Colorado, contributed the key people in Storage Technology. This two-year-old company markets replacements for IBM's high-speed 2420 tape drive, and it followed IBM by only a few weeks in announcing a 3420-compatible drive. By contrast, Potter Instrument has not drawn heavily on IBM for its people, and the same goes for Telex's tape drive operation.

Prognosis

IBM must sue its dwarfish competitors the way a porcupine makes love -- very carefully. But its current action goes hand-in-hand with a "toughening" of the company's marketing policy. Last month, a major management shakeup put new marketing men into key positions in IBM's pivotal Data Processing Division . . . men who built their reputations for getting things done in the marketplace through aggressive, competitive selling.

And in the last several months, IBM has hit the industry with a series of products offered on a very competitive price/performance basis: the 370/145, the 3330 and 2319 disks, the 3420 tape drive and the 129 buffered keypunch (EDP/IR Nov.6, 1970). These have been backed with extensive product advertising -- before now, a rather un-IBM-like tool.

The effect of IBM's suit (which is likely to be settled out of court) could be to delay the reaction of some competitors to IBM's new products, such as the 3330 and 2319 disk systems. It appears to be IBM's warning to the independents

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that the giant thinks they are following too closely. In the broader picture, such actions may cut down the enthusiasm of IBM employees for going it alone with products designed to directly displace the same type of products they worked on at IBM.

This effect could, paradoxically, help independents such as Memorex as much as it helps IBM by slowing the rate of formation of new competitors in the IBM-compatible business.

CALCOMP DISK SALES BRING RECORD EARNINGS.

California Computer Products reports that its first quarter earnings of $420K are more than quadruple those of the fiscal 1970 first quarter, and revenues jumped by 86% from $4.6M last year to $8.6M this year. This unusual showing during the general slowdown is due to Calcomp's relatively new disk file business. (It markets to end-users disks produced by its 65%-owned subsidiary, Century Data Systems). Plotter sales -- which gave Calcomp its fame originally -- have stayed about the same as they were last year.

According to Calcomp, poor economic conditions have caused users to look for ways to cut costs and improve performance, and its disk file line -- plug-to-plug compatible with IBM units -- caters to this desire. During the first quarter, Century Data booked orders which included one for $25 million worth of disk systems which it will deliver OEM to Burroughs over a three-year period. Calcomp also says that it has expanded marketing of the disk systems from a small number of major metropolitan areas to all of its 32 U.S. sales offices.

NEW REGISTRATIONS OF COMPUTER COMPANIES

These days, stock offerings are few and far between. Following the overall trend, only a handful of computer industry companies have filed in the last several months. And most of those offerings will be for sale of shares already outstanding. The two recent exceptions -- Redcor and Data General -- are both minicomputer makers.

[Listed below are brief descriptions of proposed security offerings, from firms in the data processing field, that are currently in registration with the Securities and Exchange Commission. The preliminary prospectus for any issue may be obtained from the underwriter.]

DATA GENERAL CORP.	Data General Corp., Route 9, Southboro, Mass. 01772, a minicomputer manufacturer, on Nov. 17 filed 600,000 common -- 300,000 to be sold by the company and 300,000 (outstanding) by the holders. Proceeds, at terms to be supplied by amendment ($30 max.), will be used for various general corporate purposes including the financing of receivables and inventories and purchase of plant equipment. The underwriter will be Loeb, Rhoades & Co. and Bache & Co. Inc., both of New York City.
REDCOR CORP.	Redcor Corp., 21200 Victory Blvd., Woodland Hills, Cal. 91364, which manufactures mini's and associated equipment, on Nov. 27 filed 1,200,000 common. The shares will be issued in exchange for $3M of outstanding 8% secured convertible notes issued by Redcor Sept. 30 in a private placement. They are convertible at $2.50 per share and may be offered for sale from time to time by the recipients at prices current at the time of sale ($5 max.).

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November 2, - November 20, 1970

	1970 High	1970 Low	3 week Sales in 100's	3 week High	3 week Low	Last	3 week Net Change	3 week % Change
NEW YORK STOCK EXCHANGE								
Addressograph-Multigraph	62	21	3255	27 5/8	21 1/8	22 5/8	- 4 1/4	-16
American R & D	99 1/2	37 1/8	2154	55 1/2	45 3/8	47 5/8	- 2 3/8	- 5
Ampex Corp.	48 1/2	12 1/2	2964	17 5/8	14 5/8	15 1/4	- 2 1/8	-12
Automatic D P	47 3/4	23 1/2	1213	44 1/2	40	43 5/8	+ 2 1/4	+ 5
Bunker Ramo	14 1/2	6 1/8	1458	9 1/2	8 1/2	8 3/4	- 1/8	- 1
Burroughs	172 3/4	78 5/8	7038	116 3/4	99 5/8	102 7/8	-10 1/2	- 9
Collins Radio	37 1/4	9	793	15 7/8	11 1/2	12 1/8	- 2 1/2	-17
Computer Sciences	34 1/8	5 3/8	3181	12 1/4	9 1/8	10	- 1 3/8	-12
Control Data	122 1/2	28 3/4	3846	47 3/8	41 1/8	47 1/4	+ 1 1/2	+ 3
Data Proc. Fin. & Gen.	32	6 5/8	1784	13 5/8	9 3/8	9 7/8	- 2 5/8	-21
Electronic Assoc.	11 5/8	3 5/8	294	5	4 1/8	4 1/8	- 3/8	- 8
General Electric	89	60 1/4	5390	89	84 3/8	36 1/4	+ 1/4	+
Honeywell	152	65 5/8	3999	78	70	71 7/8	- 3 7/8	- 5
IBM	387	218 3/4	4737	303	288 1/2	296 1/2	+ 2 1/2	+ 1
ITT	60 1/8	30 1/2	7049	44 7/8	41	43 1/2	+ 7/8	+ 2
Leasco	30 1/2	7	3242	13	9 5/8	10 3/8	- 1 3/4	-14
Litton	38	15 1/4	6027	24 1/8	18 3/4	19 5/8	- 4	-17
Memorex	166 3/4	44 1/2	5778	86 3/8	69 3/8	72 3/4	- 8 1/2	-10
Mohawk Data Sciences	87	18 1/8	7050	32 7/8	23	25 5/8	- 5	-16
National Cash Register	63	29 1/4	6624	36 3/4	31 1/8	33 1/2	- 1 7/8	- 5
Planning Research	53 1/4	13 5/8	2086	20 7/8	16	17 7/8	- 1 1/8	- 6
RCA	34 5/8	18 1/8	4315	24 1/2	21 5/8	22 3/4	- 1/2	- 2
Raytheon	33 5/8	16 1/8	882	21 7/8	20	20 3/8	- 7/8	- 4
SCM	24 3/4	11 1/8	1427	14 3/8	11 5/8	12	- 1 3/4	-15
Sanders	29 7/8	7 1/8	724	13 1/4	9 5/8	10 3/8	- 1 3/4	-14
Sangamo	29 1/8	9 1/8	2150	15 5/8	11 3/4	13	- 1 3/8	-10
Singer	85 3/4	53 1/4	1262	64 3/4	60 3/4	61	- 3 3/8	- 5
Sperry Rand	40 3/8	18 3/4	5874	24 1/2	21 5/8	22 3/8	- 3/4	- 3
Teledyne	40	13	5192	21 3/8	17 1/2	18 1/8	- 1 1/2	- 8
Telex	25 7/8	9 1/8	39,016	25	17 5/8	19	- 3 7/8	-17
University Computing	99 3/8	13 1/4	7971	24 3/8	18 5/8	19 7/8	- 1 1/2	- 7
Western Union	48 1/4	31	1227	36 1/8	34 1/8	35 1/2	+ 1/2	+ 1
Xerox	115 3/4	65 1/4	7307	89 1/2	81 3/8	84 3/4	- 1 3/4	- 2
NYSE COMPUTER STOCK AVERAGE							- 2.0	- 7.7
AMERICAN STOCK EXCHANGE								
Applied Data Research	24 1/4	3 3/4	151	6 3/8	5 3/8	5 3/8	- 3/4	-12
Bolt, Beranek & Newman, Inc.	8 3/4	6 1/4	110	7 1/2	6 1/4	6 1/4	- 1	-14
Calcomp	34 5/8	10 1/4	5698	34 5/8	27 1/2	30	- 2	- 6
Clary Corp.	10 1/2	3 3/8	323	5 7/8	3 3/4	4 1/2	+ 1/8	+ 3
Computing and Software	75 3/4	16 1/4	900	31	26 3/4	29 5/8	- 1/2	- 2
DPA, Inc.	10 3/8	3 3/8	305	4 3/4	3 7/8	3 7/8	- 7/8	-18
Data Products	25 1/2	4 3/4	2248	7 3/4	6	6 1/2	- 1/8	- 2
Digital Equipment	124	48 3/4	2567	61 5/8	52 3/4	56	- 1 1/2	- 3
Granite Mgt.	22 1/4	7 3/8	319	11	8 3/4	9 1/4	- 1 3/8	-13
Greyhound Computer	14 1/8	5	183	7 3/4	6 3/8	6 3/8	- 1/2	- 7
ITEL	25 1/2	6 1/8	3319	18 7/8	15 3/8	16 1/4	+ 1/4	+ 2
Levin-Townsend Comp.	19 3/8	3	619	6 5/8	4 7/8	4 7/8	- 3/4	-13
Milgo Elect.	40 1/2	15	4678	35 3/4	27 1/8	30 3/4	- 1 1/2	- 5
Potter Instrument	42 3/4	14 5/8	1505	22 1/2	17 1/2	17 3/4	- 2 5/8	-13
Sys. Eng. Labs.	49 1/8	10 1/8	4255	18	13	14 1/8	- 3 3/8	-19
AMSE COMPUTER STOCK AVERAGE							- 1.1	- 8.1

	1970 High Bid	1970 Low Bid	November 20, Bid	November 20, Asked	3 weeks ago Bid	3 week net change Bid	3 week % change Bid
OVER-THE-COUNTER							
Aries Corp.	8	1 1/4	2	2 1/2	2 1/8	- 1/8	- 6
Computer Usage	8 1/2	2	4	4 3/8	3 5/8	+ 3/8	+10
DASA Corp.	44	3 1/2	3 1/2	3 3/4	5 1/4	- 1 3/4	-33
Digitronics	13 3/4	3 5/8	3 5/8	4 1/2	4 1/4	- 5/8	-15
Fabri-tek	8 1/2	2	2	2 3/8	3	- 1	-33
Informatics, Inc.	20 1/2	4 1/4	6 1/8	6 5/8	6 1/4	- 1/8	- 2
LMC Data, Inc.	3 5/8	1	-	-	1 1/2	N/A	N/A
Management Assistance	4	1	1	1 1/4	1 1/8	- 1/8	-11
Optical Scanning Corp.	52	11	15	16 1/2	15 1/2	- 1/2	- 3
Recognition Equipment Inc.	83 1/2	12 3/8	13	13 1/2	16	- 3	-19
TBS Computer Centers Corp.	27	4	4 1/4	5 1/4	4 1/2	- 1/4	- 6
Tally Corp.	23	9 1/2	12	13	15 1/2	- 3 1/2	-23

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